# THE PRICE IMPACTS OF REVERSE STOCK SPLITS

By

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A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL OF
THE UNIVERSITY OF FLORIDA
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

University of Florida

1974

This study is dedicated to my family . . . present and past.

# ACKNOWLEDGEMENTS

The author wishes to thank Dr. John B. McFerrin, Chairman of the Supervisory Committee, for many cogent comments and criticisms, and for his wise counsel throughout the period of graduate studies. Dr. Robert C. Radcliffe was appointed Co-Chairman during the latter stages of the project. His inspired insights, timely suggestions, and assistance were the _sine qua non_ of this study. The remainder of the Supervisory Committee, Dr. Ralph H. Blodgett, Dr. C. Arnold Matthews, and Dr. John H. James, have been unfailing in providing inspiration and encouragement.

Two of the author's collegues at The University of West Florida are due special thanks, Dr. Hite Bennett was a major source of technical assistance and incisive comment. Dr. Jane E. Dysart proof-read the manuscript and provided an occasional hot meal.

Heartfelt appreciation is also due The University of West Florida Computer Services Center and especially Messrs. Russell Lee and Art Haney.

Finally, appreciation must be expressed to Mrs. Nadia Scheffer and Mrs. Marguerite E. Martin for typing the manuscript under most trying circumstances.

Abstract of Dissertation Presented to the Graduate Council
of the University of Florida in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

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June, 1974

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Reverse split common stocks are examined to ascertain whether a reverse split has any impact on security prices. The population is defined as 44 American Stock Exchange and New York Stock Exchange listed stocks which were reverse split between January, 1960 and June, 1973. Various aspects of the population are examined through observations of characteristic distributions and statistical analysis of several cross sections of the population.

Unusual price behavior was observed to begin considerably in advance of the effective date of the reverse split and persist for an extended period after the split date. The behavior of prices during a one year post-split examination period was determined to be relatively positive for: securities priced at or above $15.00 per share; those securities listed on the New York Stock Exchange; and those stocks reverse split in declining markets. Dividend histories were determined to have no significant observable effect upon price performance.

Evidence of a possible exception to the Efficient Markets Hypothesis has been developed. Evidence was also developed for support of a potentially profitable market trading rule.

It is suggested that reverse split may have negative information content inherent in them, and it is shown that abnormal profits may be available by selling short reverse split common stocks at the effective date of the reverse split.

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# CHAPTER I
# BACKGROUND FOR THE STUDY

## Introduction

A reverse split occurs when the common (or preferred) equity of a corporation is consolidated into fewer shares. At the same time, the shares may undergo an increase in the par or stated value, but this is by no means a universal characteristic. In many instances, the reverse split is but a part of a financial reorganization plan under which the shares may be actually decreased in their par or stated value.[1]

Rationally, the consolidation of the equity shares into a smaller total number should not create anything of a greater or lesser value than that which had existed prior to the reverse split. The stockholders' proportionate ownership interest remains unchanged; albeit this interest is now represented by a smaller total number of shares. Stated differently: if 100 shares representing 1 percent of the total common equity of a given corporation has a market value of $1,000, and if the given corporation elects to reverse split its shares on the basis of one-for-two; then 50 shares, post-split, will represent the same 1 percent of the total common equity of the corporation, and these shares should have an aggregate market value of $1,000.

Despite this obvious logic, a decline in the market value of the reverse split shares is often observed around the time of the reverse split. It would appear, then, that either the investing public (*i.e.* the market) does not understand the real nature of the reverse split, or there exist other factors influencing the price of the security in question which have remained heretofore unexplained.

Some writers have contended that there should be an increase in the market value of the reverse split shares since the price has been adjusted to a more popular trading range.[2] The basis for this contention has its roots, one would suppose, in supply and demand theory. By inflating the share price so that it is in the same price range of the more respectable investment vehicles would appear to place these "new" shares in a much wider market of prospective investors -- or, perhaps, a different market altogether.[3] Since there are potentially more investors who may be interested in purchasing the shares in the more popular trading range, demand for the shares might be greater, and a bidding up of the market prices of the reverse split shares might occur. An increase in the total value of the common (or preferred) equity would therefore be the result. Even though this theory has an appealing rationality, there appears to be little in the way of a factual foundation for it.

For some reason, a decrease in the market value of the reverse split shares is often observed in the period of time surrounding the reverse split, but it is as yet uncertain whether this decline in market values is due to the reverse split action itself. Evidence of split-related price changes would be of great interest to the investing public. There should also be great interest by corporate management which may be considering a reverse split proposal.

At this point a hypothetical example of a reverse split would be helpful in order to clarify terminology. If a stock is reverse split one-for-five (1:5), the shares outstanding are consolidated or divided by a factor of five. The factor by which the shares are reduced in number is referred to as the split ratio, and the day that the new shares are first admitted to trading is referred to as the effective date or the split date. Also, on the effective date the new shares should display an opening price approximately five times the previous day's closing price (all other things being equal). Any comparison of dividends, earnings, price, and/or volume must make adjustment for the split ratio. In the above example, the adjustment would be made by multiplying all pre-split price, earnings, and dividend data by the split ratio. Volume data, on the other hand, must be adjusted in the opposite manner.

At this time some rather dramatic changes may occur in the Stockholders' Equities portion of the Balance Sheet of the hypothetical firm *if* the par or stated value of the common equity is not *increased* by a multiple of five. To extend the hypothetical example, suppose the Stockholders' Equities section of the Balance Sheet appeared -- pre-split -- as follows:

| | |
|---|---|
| Common Stock; 5,000,000 shares issued & outstanding; $1.00 par . . . | $5,000,000 |
| Retained Earnings . . . . . . . . . . . . | (1,500,000)[4] |
| Total Stockholders' Equities: . . . . . . | $3,500,000 |

If the par value of the common stock is increased by the ratio of the reverse split (5) to $5.00, then the Stockholders' Equities section of the Balance Sheet will remain virtually unchanged. The only noticeable change will be that the Common Stock notation would read ". . . 1,000,000 shares issued and outstanding; $5.00 par." It is to be noted that the debit (deficit) Retained Earnings balance remains unchanged.

On the other hand, if the par value of the common shares were to remain unchanged per a financial reorganization plan, then some rather drastic changes will have to occur. In the first instance, a new capital account will appear in the Stockholders' Equities section: "Capital Paid-in in Excess of Par." Furthermore, this account will have an initial balance of $4,000,000. The Stockholders' Equities section of the hypothetical Balance Sheet would then appear thus:

| | |
|---|---|
| Common Stock; 1,000,000 shares issued & outstanding; $1.00 par . . . | $1,000,000 |
| Capital Paid-in in Excess of Par (from reorganization) . . . . . . . . | 4,000,000 |
| Retained Earnings . . . . . . . . . . . . | (1,500,000) |
| Total Stockholders' Equities. . . . . . . | $3,500,000 |

Note that the Retained Earnings debit balance is still intact with all that this condition implies.

The reorganization plan approved by the stockholders may provide for the transfer of values in the newly created capital account to the Retained Earnings account to relieve restrictions which a Retained Earnings deficit creates.[5] If such were to be the case, the Stockholders' Equities section of the hypothetical Balance Sheet might appear as:

| | |
|---|---|
| Common Stock; 1,000,000 shares issued & outstanding; $1.00 par . . . | $1,000,000 |
| Capital Paid-in in Excess of Par (from reorganization) . . . . . . . . | 2,500,000 |
| Total Stockholders' Equities: . . . . . . | $3,500,000 |

Can this be the same firm? The answer to that question is: "Yes and no." This example has followed procedures allowed by SEC Regulation S-X, and subsequent Accounting Series Release(s) by the same authority. It has served to illustrate that by the simple act of not increasing the par value of the common stock by the ratio of the reverse split -- in this example, by not increasing the par value at all -- the Retained Earnings debit balance (deficit) has been made to disappear. The resulting zero balance in the Retained Earnings account, in the absence of restrictive covenants or other restrictions to the contrary, will allow the firm to commence (or resume) payment of regular dividends should sufficient earnings be generated from this point.

It must be emphasized that there has been no attempt to engage in any deception here on the part of the firm (Regulation S-X takes care of that). There may be some subsequent investors who will be unaware of the history of the Retained Earnings account balance -- believing that it arose in the normal manner. If so, it will be the fault of these investors in that they did not investigate the security sufficiently.

It is through the possible manipulation of the capital accounts (specifically the Retained Earnings account) that those writers referred to above (on page 2 ff.) may have further justification for thinking that real price increases would follow a reverse stock split.[6]

The purpose of this paper is to report the results of a study which attempts to identify any significant price change associated with a reverse split. Through the use of various statistical techniques this analysis will attempt to determine: 1) the degree of any real price declines; and 2) when the most severe price declines are likely to occur (if, indeed, they do).

As mentioned earlier, not only the investing public, but also the officers and directors of publicly held corporations should find these results of interest. The determination of when price declines are likely to occur should be of greatest interest to the market speculators and short-term traders should a reliable predictor be developed for the market prices of reverse split shares.

## PREVIOUS STUDIES OF REVERSE STOCK SPLITS

Published material dealing with the reverse split is very scanty, amounting to no more than three articles from the financial press over the past forty years and an occasional reference in text books. The obvious reason for the dearth of research and/or published material concerning the reverse stock split is the relative rarity of this phenomenon. For the period January, 1960 through September, 1973 there were only some 75 to 80 instances of reverse splits among all issues listed on the New York Stock Exchange and the American Stock Exchange.

One outstanding characteristic of the material which is available is that it is almost entirely descriptive and devoid of analysis. Furthermore, at no point is there any investigation of price movements -- either pre-split or post-split.[7] Various authors have described the conditions which may give rise to the reverse split, and the mechanical aspects of such action from the corporate viewpoint.[8] One or two have examined the reverse split from the stockholders' side,[9] but, again, there has been no real analysis of the price movements which may occur.

As a result of the rarity of the phenomenon under examination and the understandable lack of previously published material directly related to the question at hand, this author has been forced to rely, to some extent, upon studies of the better-known stock split for analytical insights and techniques. It is the author's belief that if the studies of stock splits are valid insofar as techniques (and, to a somewhat lesser extent, conclusions) are concerned a simple upending of the various hypotheses will be equally valid for a study of the reverse split.

One of the earliest studies of the reverse split was done by J. H. Madden.[10] This 1931 article called upon corporate management to reverse the split-up movement which had gained great momentum in the middle and late 1920's. Madden's arguments were, of course, couched in terms of the conditions which were prevalent in the early days of the Depression. These conditions (insofar as the stock markets were concerned) produced low or nonexistent corporate earnings and the resulting very low share prices. The stock market collapse of 1929 had soured many investors and businessmen (particularly bankers) to the extent that the ownership of common stocks (and many if not most preferred stocks) had fallen into some disrepute. The thrust of Madden's arguments was to inflate per share earnings through the use of the reverse split, and an inflation of share prices would naturally follow.

Whether this scheme would have been successful is a moot point although it is doubtful that there would have been any increase in share prices in real terms. Although he ignored to a great extent the economic conditions which caused the crash of 1929, his contention that a wave of reverse splits would serve to correct a general corporate condition of over-capitalization[11] is essentially correct.

An article in Barrons in 1962 by Anna Merjos[12] consisted mainly of a listing of those common stocks which had been recently reverse split. Aside from a brief description of the various situations and conditions, Merjos implies that one may expect significant price declines, but she fails to reach beyond the simple implication.

The January, 1970 issue of the Financial Executive featured an article by West and Brouilette[13] concerning the reverse stock split. Again, however, this effort was concerned more with mere description of situations than with any analysis of cause and/or effect. At one point the authors concern themselves with resulting prices, but the concern is limited to the opening prices on the effective date only. The authors failed to adjust the raw data for any overall market influence. Their conclusions are rendered further suspect by virtue of their failure to even mention a 1968 ruling by the American Stock Exchange concerning low-priced (i.e. $5.00 per share and less) shares.[14]

The above mentioned three articles represent "the literature" such as it is. Aside from an occasional "house" publication[15] on the subject, and rare mention in the more popular business publications.[16] there has been virtually nothing published concerning reverse stock splits during the past ten years other than the previously mentioned single article by West and Brouilette, and text book mentions of the subject (usually in footnote form).

## STUDIES OF STOCK SPLITS

As mentioned above, due to the dearth of published material relating to reverse stock splits the author has relied to some extent on various studies of "normal" or "regular" stock splits for analytical insights. These studies would appear to be a valid point of departure for a study of reverse stock splits inasmuch as one is basically the opposite of the other. Some of the recent literature is of interest as there is a direct application to the study at hand. Other segments of the available published material (concerning stock splits) do not lend themselves to these purposes and will be ignored. Again, the main concern here is price change.

Myers and Bakay[17] attempted to compute relative price changes of split stocks. Their study was concerned with some 70 splits of New York

Stock Exchange listed issues. In order to compute relative change of prices of these securities three dates were selected as being critical to the study of price movements of any one of the securities. These dates were: a) eight weeks prior to the announcement date; b) the effective date; and c) eight weeks subsequent to the effective date of the split.

It will be helpful here to pose a hypothetical example for the explanation of the exact determination of the dates mentioned above. Assume that the board of directors of Company X announces on August 21, 1970 that at the coming stockholders' meeting it (the directors) would move that the common stock be split three-for-one (3:1) effective December 1, 1970. Assuming approval by the assembled stockholders, determination of the three critical dates would proceed as follows: Date a) is eight weeks prior to August 21 which would be June 26, 1970. Determination of the effective date, b), is somewhat more difficult. The date upon which the new shares are first admitted to trading is November 23 and not December 1. This seeming discrepancy results from the fact that the November date is the ex-distribution date while December 1 is the record date. Since each stockholder will expect to receive two additional shares for each one owned as of a specified date, the record date serves to determine which stockholders are entitled to the distribution. Since "regular way" transactions on the New York Stock Exchange (and all other registered exchanges in the United States) require five business days for completion, the stockholders' list will not reflect any changes (for purposes of distributions) on or after the ex-distribution date (November 23, 1970). There is a specific ruling by the New York Stock Exchange which applies to any security for which there is to be a distribution of any kind:

> Under a rule of the Exchange, a listed stock on which a dividend has been declared, or a distribution authorized, is dealt in on an ex-dividend or ex-distribution basis on and after the third business day prior to the record date for such dividend or distribution.[18]

In the example the new shares are first admitted to trading at the "split price" on November 24, 1970. The final date of consequence, c), is eight weeks subsequent to November 24 or January 19, 1971.

The extended time period utilized by Myers and Bakay was chosen so as to negate the price rally which they believe normally occurs in the period immediately surrounding the announcement of a stock split proposal. By examining prices eight weeks subsequent to the effective date it was hoped that a determination could be made as to whether the price changes were transitory or of a permanent nature.

A point of analytical significance in this study is the recognition of the market trend during the period of examination. The example considers a period of almost seven months (August 21, 1970 to January 19, 1971), and logic demands that some accounting be made of the movement of the general market during this time. The authors first made the prices of the various common stocks at times a), b), and c) compatible by adjusting all prices by the split ratio. The prices were then expressed as a percentage of the corresponding Standard and Poor's industrial sub-group price index for the identical dates. The resultant price "index" figures were then used to express price changes as between dates a) and b), and between a) and c). This adjustment of the prices produced a relative measure of price change for the securities in question. The "price relative" was thought to be devoid of the influence of the general market movement, and of the movement of a specific segment of the market as well.

The results as reported by Myers and Bakay indicated that the prices on the effective date, b), had advanced to an average of 120 percent of the prices on the announcement date after adjusting for market trend. A minute decline in the prices of the split stocks was noted at date c). Eight weeks after the effective date prices were noted to average 119 percent of those on the announcement date.[19]

On the basis of the above evidence the authors concluded that stock splits are accompanied by a real increase in price at least in the short run. They caution, however, that they are not certain whether the noticeable price advances are solely a function of the split action itself, or ". . . (of) some other factor common to the companies splitting their stock."[20]

Studies by Barker in 1956[21] and 1957[22] overcame, to some extent, the weaknesses of the Myers and Bakay study discussed above. Barker included the cash dividend as a control feature as he had observed that an increase in the rate of cash dividend payment often accompanied a stock split. His recognition of the increase in the cash dividend rate was simply done by the classification of all stocks in his study into two groups: those which had increased dividends, and those which had not. Price change was computed as outlined by Myers and Bakay. The time period of study for each security was greatly expanded to eighteen months by defining the date for the selection of the "base" date as one year prior to the effective date, and the final date as six months subsequent to the effective date. The reason advanced by the author for expanding the period of study in such a manner was to attempt to overcome any possible rally brought about by the touting of "split candidates" by market newsletters and reader services. In short, Barker wanted to eliminate any "leaks" of information concerning an impending stock split.

Both of Barker's studies deal with splits with a ratio of at least two-for-one but not more than three-for-one. All stocks selected for study were listed on the New York Stock Exchange. The 1956 article concerned the period 1951 through 1953; a period during which the market as a whole was rather quiet -- basically a two-year side-wise movement. Barker chose a sample of 90 splits during this period, and of the 90 he observed an increase in the cash dividend rate in 35 instances. At the effective date, the average prices of those stocks in which the cash dividend had been increased were observed to be 115 percent of the prices as determined on the "base" date one year previous. This price advance was noted to be unchanged six months after the effective date. The second group of stocks (those which had not experienced an increase in the cash dividend rate), 55 in number, displayed an average price of only 106 percent (of the "base" price) on the effective date. Six months subsequent to the effective date, even this rather modest price advance had entirely disappeared. The average price of this latter group of securities was observed to be 100 percent (i.e. unchanged) of the prices determined eighteen months previously.

Barker's 1957 paper followed basically the same analytical approach as described above. This time he sampled 88 splits recorded during the bull market of 1954-55. Included in this sample were 75 instances of cash dividend increases. This group of 75 observations produced an average price at both the effective date and six months after the effective date of 118 percent of the "base" price (determined one year prior to the effective date). In marked contrast, the second group of securities (which had not shown an increase in the cash dividend rate) yielded prices at the effective date of only 105 percent of the "base" date prices. Furthermore, with the passage of an additional six months, this latter sample of stocks produced an average price of 92 percent of the prices as determined on the "base" date.

In an attempt to explain the decline in the prices of this latter group of stocks, Barker noted that cash dividend increases are the rule rather than the exception during bull markets (such as that of 1954-55). As a consequence, this group of thirteen stocks was deficient in this respect. Thus, a decline in the average prices running counter to industry or general market trends is not only understandable but to be expected. Barker also noted that price increases of the 75 split stocks could be attributed to the size of the dividend increase. The average size of the dividend increase for this sample was 34 percent whereas the average size of increases in cash dividends for the entire market was but 13 percent during this period.

Barker's studies of stock splits and price changes were the most significant until the early 1960's. There were, however, weaknesses in these papers which were to be corrected later. The basic weakness is a failure to consider earnings as a factor to be controlled or accounted for. Further, the analysis and conclusions do not provide any probability statement or any indication of some degree of reliability which would lend some degree of certainty to his conclusions.

In 1966 Keith B. Johnson published a study which sought to isolate the price changes brought about by the splitting of common stocks.[23] His study was closely patterned after the studies by Barker (as outlined above), but through the use of selective and refined statistical techniques Johnson's findings appear to be more credible.[24]

The period of time involved for each security under examination was established at approximately twelve months. The determination of the "base" price was made at about seven and one-half months prior to the effective date, and the final or terminal price was taken at approximately four and one-half months post-split. These dates were utilized not only for the determination of initial and final prices, but also for the estimation of dividends and earnings.

Johnson also attempted to construct a definitive stock price model for the specific purpose of measuring the price effects of the stock split.[25] This model, for the most part, eliminated the "dividend bias"[26] inherent in the two studies by Barker, and the one by Myers and Bakay. Johnson accomplished this with an adjustment in the stock price model for the cash dividend rate as well as for earnings. He further included an adjustment for the market price trends based upon the movements of the Standard and Poor Industry Price Indexes. This latter factor would tend to eliminate any bias emanating from general market movements.

The study by Johnson, though largely ignored in the subsequent literature, is of no mean significance. His conclusion: ". . . for the . . . data studied here there is a significant relative price change associated with a stock split, after taking into consideration the other factors[27] included in the models."[28] He warns, however, that any cause and effect implications will be of a somewhat subjective nature in light of the fact that the splitting action may serve the market as a signal confirming opinions previously held concerning earnings, dividends, etc.[29]

Messrs. Fama, Fisher, Jensen, and Roll (hereinafter referred to as FFJR) published a landmark study in 1969 which was also directly concerned with the price movements of split stocks.[30] The major conclusions of this study were also later reported by Fama as a portion of a subsequent study.[31] The time period of examination for each security under study by FFJR was established at approximately five years; 29

months pre-split, and 30 months post-split. This study considered all stock splits with a ratio of five-for-four or greater and all stock dividends of 25 percent or more of all New York Stock Exchange listed common stocks for the period January, 1927, through December, 1959.

The authors proceeded in much the same manner as Johnson (described above) although they used more advanced statistical techniques, a much larger sample, and a wider span of time for the examination of price movements. Further, FFJR did not utilize a control factor (or variable) for earnings; evidently relying upon the theory that the cash dividend rate is the only important independent variable.

FFJR conclude that the ". . . data suggest that once the information effects of the associated dividend changes are properly considered, a split per se has no net effect on common stock returns (prices)."[32] Consideration of the effects of dividend changes is really what the FFJR paper is all about, and an interesting corollary finding not only tends to support FFJR's proposition, but is also germane to the issue at hand.

The authors noted that when the securities were grouped according to whether dividends were "increased" or "decreased"[33] the two groups showed significantly different performances with regard to price movements. The dividend "increased" category tended to maintain the price advance which had occurred during the 29 months prior to the effective date of the stock split. The price advance was more or less maintained intact for the entire 30-month post-split examination period. The dividend "decreased" category, however, displayed about the same pre-split price advance, but much of the advance was erased during the early portion of the 30-month post-split examination period. The pre-split price advance was diminished to the extent that the prices of these securities (taken as a group) were at about the same level (on an adjusted basis) as the prices five months pre-split.[34]

Again, the basic conclusion reached by the authors concerns the information effects of dividend changes upon stock prices. A stock split may be considered to be a very strong signal to the market that a dividend increase is to be forthcoming inasmuch as such is normally the case -- or, at least, normally thought to be the case.[35] If the expected dividend increase is not forthcoming the market then re-evaluates its previous conclusions concerning the security in question -- in terms of its price -- and bids the price downward. Such conclusion accepts, at least implicitly, the so-called Gordon model[36] as a basis of valuation.

## REASON FOR THE STUDY

The purely descriptive nature of all previous inquiries concerning the reverse stock split would be sufficient reason to initiate an analytical investigation of the subject. If further justification for a study of this phenomenon be needed; the current American Stock Exchange Listing Form L requires a reverse stock split in certain circumstances.[37]

Recent studies of the well-known stock split have served to put-to-rest the notion that simply splitting a common stock will cause an increase in the real price of that security. These studies have been of great value to the study at hand in that it has now been proved that simply changing the number of shares outstanding, all else being equal, will not result in significant changes in the real prices of the affected securities -- in certain situations (i.e. the circumstances normally surrounding a stock split). However, the reverse split, while seeming to be but the mirror image of the stock split (and, one would expect, therefore, the same results in terms of security prices), is so significantly different in terms of investor psychology alone as to require substantial investigation.

## Notes

[1] For example, in 1962 Bearings, Inc. reverse split its common stock one-for-three (1:3). Stockholders exchanged three shares of $0.50 par value for one share of common without par value. See also discussions of quasi-reorganizations in H. Simons and W. E. Karrenbrock, Intermediate Accounting-Comprehensive Volume (5th edition; Chicago: South-Western Publishing Company, 1964), p. 626 ff. and S. Davidson, ed., Handbook of Modern Accounting (New York: McGraw-Hill Book Company, Inc., 1970), pp. 26-17 ff., 27-18.

[2] See A. S. Dewing, The Financial Policy of Corporations (New York: The Ronald Press Company, 1953), II, 1194.

[3] Currently shares selling at or below $5.00 per share are not generally eligible for margin accounts.

[4] The deficit Retained Earnings balance shown here is not absolutely necessary to the demonstration of the example.

[5] Most state laws prohibit the payment of other than special liquidating dividends if the Retained Earnings account has a debit (deficit) balance. See Simons and Karrenbrock, p. 734n.

[6] Prior to the advent of the Securities and Exchange Commission and the rules and regulations which have come from this agency, there may have been overt attempts to mislead prospective investors through just such an operation as outlined above. Such deception might cause at least a temporary rise in the prices of the securities involved.

[7] A partial exception to this statement is to be found in R. R. West and A. B. Brouilette, "Reverse Stock Splits . . . Harbinger of Bad Times or Valid Management Technique?," Financial Executive, XXXVIII (January, 1970), 12-17. This article is concerned with the prices of the split shares on the effective date only.

[8] Dewing, p. 1194 ff. See also J. I. Bogen, ed., Financial Handbook (3rd ed. rev.; New York: The Ronald Press Company, 1959).

[9] Anna Merjos, "Reverse Stock Splits: More Stockholders Are Learning About Them the Hard Way" Barrons, XLII (May 28, 1962), 9. See also West and Brouilette, 12 ff.

[10] J. H. Madden, "Present Financial Situation Calls for Reversal of Stock Split-Up Movement," New York Times Annalist, XXXVIII (August 14, 1931), 262.

[11] Over-capitalization may be defined as a condition wherein the number of common shares outstanding is greatly in excess of the number which would be indicated by the asset structure and/or the volume of earnings available to the common stockholders. See P. M. Van Arsdell, Corporation Finance, (New York: The Ronald Press Company, 1968), pp. 149-150.

[12] Merjos, p. 9.

[13] West and Brouilette, p. 12.

[14] See American Stock Exchange Listing Form L, (New York: American Stock Exchange, Inc., 1969), p. 10.

[15] See, for example, Investor's Reader (New York: Merrill Lynch, Pierce, Fenner, and Smith), XXIX (October 24, 1962), 1.

[16] "The Market's Untouchables," Business Week April 7, 1973, p. 76.

[17] J. H. Myers and A. J. Bakay, "Influence of Stock Split-Ups on Market Price," Harvard Business Review, XXVI (March, 1948), 251.

[18] "Stock Split-Ups," Company Manual, (New York: New York Stock Exchange, Inc., 1970), p. A-155.

[19] Myers and Bakay, p. 253.

[20] Ibid., p. 254.

[21] C. A. Barker, "Effective Stock Splits," Harvard Business Review, XXIV (January-February, 1956), 101.

[22] C. A. Barker, "Stock Splits in a Bull Market," Harvard Business Review, XXXV (May-June, 1957), 72.

[23] K. B. Johnson, "Stock Splits and Price Change," Journal of Finance, XXI (December, 1966), 675.

[24] This is not to imply that the mere inclusion of "statistical technique" makes one approach more valid than another although it does indicate, to some extent, a depth of analysis.

[25] Johnson, p. 677.

[26] See I. Friend and M. Puckett, "Dividends and Stock Prices," American Economic Review, LIV (September, 1964), 644.

[27] i.e. earnings, dividends, and market trend.

[28] Johnson, p. 685.

[29] Ibid., p. 685.

[30] E. F. Fama, L. Fisher, M. C. Jensen, and R. Roll, "The Adjustment of Stock Prices to New Information," International Economic Review, X (February, 1969), 1.

[31] E. F. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," Journal of Finance, XXV (May, 1970), 405.

[32] Fama, et al., p. 17.

[33] Ibid., p. 8.

[34] *Ibid.*, p. 17.

[35] Barker (1956); Fama, *et al.*, p. 25.

[36] M. J. Gordon, "The Savings, Investment, and Valuation of a Corporation," *Review of Economics and Statistics*, XLIV (February, 1962), 37.

[37] American Stock Exchange, p. 10.

# CHAPTER II
# RESEARCH METHODOLOGY

## Introduction

The purpose of this chapter is to present the research methodology to be used and the theoretical justification for such methodology. First, the theoretical background is reviewed. This includes a discussion of the efficient markets hypothesis and capital market theory. Second, the implications of the theory are briefly reviewed followed by a discussion of the economics of the reverse split. Building upon both the theoretical background and the reverse split economics, several hypotheses are stated. Finally, the method of data collection and statistical test used to examine the specified hypotheses are briefly reviewed.

## Theoretical Background

In recent years considerable work has been done examining security risks, security returns, and overall market efficiency. In this section we will briefly review the arguments behind this growing body of knowledge. This is done so that we may draw testable implications from the the theory as it relates to reverse stock splits. We shall find that the principle conclusions suggested by the theory are as follows:

1) Security prices fully reflect all known relevant information.
2) Security prices change only as new information becomes available to the market.

3) As such, security price movements should be random in nature since changes occur only due to new information and such information enters the market at random intervals and with random values.
4) Anticipated returns on securities increase only as the uncertainty (or risk) inherent in such returns increases. Thus, risk essentially represents uncertainty about future information flows related to the security.
5) Such uncertainty can be segregated into an overall market component, and a stock-unique component. Since the stock-unique component can be easily diversified, the only relevant portion of risk is, therefore, market risk.

## Objective of Investment Management

In the past, numerous objectives of investment management have been posited. Among these one would have to include the objectives of maximizing expected returns, liquid or current income, capital appreciation, preservation of principle, providing an inflationary hedge, obtaining tax advantages, etc. However, recent theoretical and empirical research indicates that a larger overall objective exists which encompasses each of the preceding possible objectives; this objective is the maximization of utility.

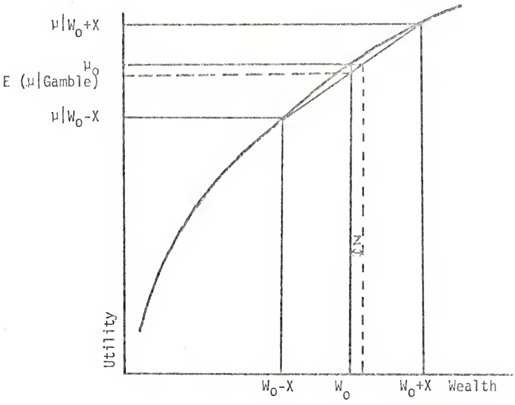
Utility may be defined as the subjective satisfaction or pleasure one receives from the consumption of an item. Since consumption is possible only if a positive level of wealth exists, we may think of utility as being a function of wealth.

Considerable work has been done on utility theory. For example, see Arrow,[1] Borch,[2] Debreu,[3] Friedman and Savage,[4] Pratt,[5] and finally Von Neumann and Morgenstern.[6] We need not review the consensus of opinion which these authors share. It should suffice to say that the utility curves of risk-averse individuals: a) increase monotonically over wealth; and b) increase at a decreasing rate. These two properties are shown in Figure 1.

The implications of decreasing marginal utility are particularly profound in the theory of how securities should be selected. That is, decreasing marginal utility infers that the only criteria which should be examined when evaluating a security are expected return and risk.

FIGURE 1

Decreasing Marginal Utility



This can be shown by the following example. Assume an individual has a present wealth level of $\underline{W_0}$ with a corresponding utility of $\underline{U_0}$ as shown in Figure 1. The individual is now given the opportunity of entering into a fair bet. The bet consists of receiving $\underline{X}$ additional dollars if the outcome is favorable or losing $\underline{X}$ dollars if the outcome is unfavorable. The "odds" of the outcomes are equal. On an expectations basis his expected wealth level is the same as his present wealth level; i.e. he has a zero expected return. However, if the outcome is unfavorable his utility would be $U|W_0 - X$, and conversely his utility would be $U|W_0 + X$ if the outcome is favorable. Note that his expected utility, given he takes the gamble, is less than his present utility ($\underline{U_0}$). An individual with decreasing marginal utility over wealth will never accept the fair bet. This rationale is quite simple. The utility of possible dollars gained is more than offset by the utility of possible dollars lost. Before the individual would accept the bet he must be paid at least $\underline{Z}$ dollars. The receipt of $\underline{Z}$ dollars would allow him to have an expected utility, given the gamble, equal to his present utility.

The implications of this analysis are two. Utility maximization involves a consideration of both risk and expected return.

## Return-Risk Measurement

Defining potential returns on any security is a fairly easy measurement concept. It simply represents the percentage increase in value over some time period. Mathematically we will define return on any stock as follows:

$$R_i = \frac{P_t - P_{t-1} + D_t}{P_{t-1}}$$

where: $R_i$ = the return on the ith security

$P_t$ = the price of the security at time t;

$D_t$ = the cash dividend paid; and

$t$ = the time period under examination.

Numerous authors have shown both theoretically and empirically that returns on any security are essentially composed of two components. As mentioned previously, the first relates to moves in the overall securities markets, and the second to "stock-unique" events. (For example see Sharp,[7] Jensen,[8] and Fama.[9]) Mathematically the following returns generating process is usually assumed:[10]

$$\tilde{R}_{it} = R_{ft} + \beta_i(\tilde{R}_{mt} - R_{ft}) + \tilde{e}_{it}$$

where: $\tilde{R}_{it}$ = the random return on stock i in period t;

$R_{ft}$ = the risk-free interest rate in period t;

$\beta_i$ = the sensitivity of returns on i to market returns;

$\tilde{R}_{mt}$ = the random return on the market in period t; and

$\tilde{e}_{it}$ = the random stock-unique return on i in period t where $e_{it}$ $(0,\sigma_e)$; $\text{cov}(e_{it},e_{jt})=0$.

Note that the expected return is:

$$E(\tilde{R}_{it}) = R_{ft} + \beta_i(E(\tilde{R}_{mt}) - R_{ft}),$$

and the variance of returns (which we shall utilize as a proxy for risk) is:

$$\text{Var}(\tilde{R}_{it}) = \beta_i^2\ (\text{Var}(\tilde{R}_{mt})) + \text{Var}(\tilde{e}_{it}).$$

That is, the variance of returns on any stock is composed of uncertainty about the general market, and uncertainty about the individual stock, market aside. These two components are respectively referred to as systematic (non-diversifiable) and unsystematic (diversifiable) risk. It has been shown by Evans and Archer,[11] and others that by the time ten securities are added to a portfolio, the stock-unique risk disappears. Thus, the crucial determinant of both expected return and risk is the market sensitivity measure, $\beta_i$. Usually $\beta_i$ is estimated via classical linear regression analysis using historic market and security returns.

## Portfolio Theory

Since the investor need only consider expected return and potential risk as defined by $\beta$ when selecting securities to be held, what we would like to do is to find that portfolio which will maximize return for a given risk level. This can be done by solving the following mathematical programming model:

$$\text{Max } E(R_p) = \sum_{i=1}^{N} X_i R_i$$

$$\text{S T } Var(R_p) \geq \sum_{i=1}^{N} \sum_{j=1}^{N} \beta_i \beta_j Var(R_m) +$$

$$\sum_{i=1}^{N} Var(e_i)$$

$$1.0 = \sum_{i=1}^{N} X_i$$

where:

$E(R_p)$ = the expected return on portfolio p;

$Var(R_p)$ = the variance of return on portfolio p;

$X_i$ = the percentage of the portfolio invested in stock i; and

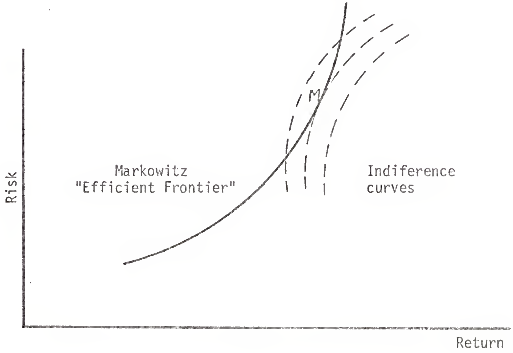
N = the number of stocks examined.

Again, risk is broken down into market and stock-unique factors. As we increase the number of securities held, $\Sigma \text{Var}(e_i)$ disappears.

Solving this model would lead to a set of efficient portfolios referred to as the "Efficient Frontier" in Figure 2. The set is convex because security returns are neither perfectly positively correlated nor perfectly negatively correlated.

FIGURE 2

Efficient Portfolio Concept



After the investor has created this "optimal investments opportunity set" he subjectively decides which particular portfolio he would prefer to hold. At the conceptual level this involves finding that point on the frontier tangent to an "indifference curve" (as between risk and return); i.e. portfolio M would be selected in the above case.

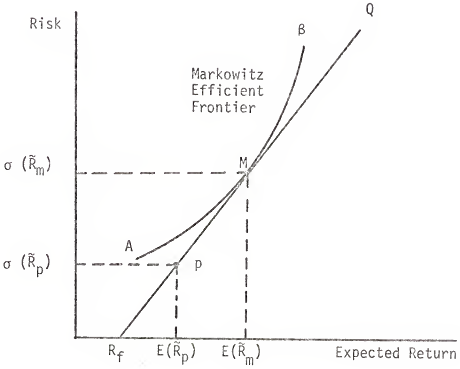
The "Efficient Frontier" and the concept of efficient diversification is usually credited to Professor Markowitz.[12]

## Capital Market Theory

Figure 3 illustrates again the Markowitz mean-variance portfolio model. Let us now assume the existence of a risk-free asset which is denoted as $R_f$. Now the investor is faced with not only possible combinations of risky assets, but also a portfolio consisting of various combinations of risky and risk-free assets. In this case some of the portfolios which were previously "efficient" on the Markowitz frontier have become inefficient. An investor would clearly prefer various combinations of $R_f$ and $M$ to combinations represented by $AM$. The line segment $R_fM$ is a linear relationship

FIGURE 3

Mean-Variance Portfolio Model



due to the fact that the risk inherent in $R_f$ is zero. As we proportionately increase investment in $M$, risk increases in the same proportions.

In addition, if the investor can borrow as well as lend at the risk-free rate, $R_f$, the new set of feasible portfolios extends beyond $R_fM$ to $R_fMQ$. The exact position of the selected portfolio will depend upon the investor's degree of risk aversion.

Now, if one assumes that: 1) all investors face the same risk-free borrowing and lending rate; and 2) all investors have homogeneous expectations with regard to $AMB$; then all investors will seek to purchase $M$ and no investors will wish to purchase either $AM$ or $BM$. But, since all securities in the market are held by somebody $M$ must therefore represent all securities in the market. Thus, the optimal portfolio, $M$, for all investors must consist of all securities in the market.

The returns from any efficient portfolio, $P$, which is located along $R_fMQ$ will be linearly related to the returns from the market portfolio ($M$).[13] This may be mathematically expressed as:

$$E(\tilde{R}_p) = R_f + \lambda\sigma(\tilde{R}_p);$$

where

$$\lambda = \frac{E(\tilde{R}_m) - R_f}{\sigma\tilde{R}_m}.$$

Further, $\tilde{R}_p$ may be expressed as:

$$\tilde{R}_p = \alpha\tilde{R}_m + (1 - \alpha)\ R_f;$$

where $\alpha$ is the proportion of the total portfolio invested in the risky assets. The standard deviation of $R_p$ (a commonly-used measurement of relative portfolio risk) is simply:

$$\sigma(R_p) = \alpha\sigma(\tilde{R}_m).$$

That is, the risk associated with the expected returns of a given portfolio is a direct function of the level of risk of that portion of the portfolio invested in risky assets. Furthermore, if the investor changes the composition of the portfolio to include proportionately more risky assets it must be recalled that the change in total utility will be equal to zero provided the revised portfolio remains efficient (*i.e.* it falls along $R_fMQ$ per Figure 3).

Finally, it can be observed from Figure 3 and subsequent discussion that the return from any portfolio of assets (or any single asset) is a function of the risk-free return and any market premium for risk. It should be noted that although the standard deviation ($\sigma$) or variance ($\sigma^2$) serves well as a measurement of relative portfolio risk, the appropriate risk measurement for the individual asset included in the portfolio is its covariance with the market portfolio -- $\mathrm{Cov}(\tilde{R}_j, \tilde{R}_m)$. Even though diversification may eliminate the effects of an asset's variance upon the variance of a portfolio, this cannot negate the possible adverse effects of an asset's covariance with other assets.

If this is true, then the relevant portion of risk in a single security is its overall sensitivity to returns in the market, or $\beta_i$ in the following model:

$$R_i = a_i + \beta_i R_m + e_i.$$

Firm or stock-unique risk ($e_i$) is not important. This was discussed earlier, but on statistical grounds. We can now say that $\beta_i$ is the appropriate risk measurement on theoretical grounds as well.

## Efficient Markets Hypothesis

Each of the theoretical constructs just discussed (utility theory, risk-return measurement, portfolio theory, and capital market theory) lead up to the concept of the Efficient Markets Hypothesis (hereafter EMH). The EMH proponents suggest that the securities markets are prime examples of competitive markets. That is, there are numerous sophisticated participants, ease of exit and entry to the market, information is freely and instantly given to all participants, and there are small transaction costs. In such a market prices should fully reflect all known relevant information, and such prices should change only as new information becomes available. Since information, in all likelihood, arrives at random times and with random values, it follows that prices should change randomly as well.

Mathematically the EMH may be expressed as follows:

$$E(P_{t+1} | \phi_t) = [(1 + E(R_{t+1}) \mid \phi_t] P_t;$$

where $\phi_t$ is the information available at period $\underline{t}$. Figure 4 illustrates the interrelationships between the theory previously discussed and the EMH.[14]

Empirical tests of the EMH can be divided into three types: a) weak form tests; b) semi-strong form tests; and c) strong form tests. Weak form tests examine whether or not historical information is of any value in forecasting future price movements. Results by Fama,[15] Osborne,[16] Cootner,[17] Jensen and Bennington,[18] and others all suggests that historical information is of no use in forecasting future price movements. Semi-strong form tests examine the reaction of market prices to new information. Essentially, they question how long it takes prices to reach a new equilibrium level once the new information is known. Research indicates that information is often anticipated (e.g. see the Ball and Brown[19] study of earnings announcements) and instantaneously evaluated once known. The study performed here is just such a test. The strong form tests examine whether indeed information is freely available to all participants or if there appears to be monopolistic access to information. To date, research

FIGURE 4

Theoretical Interrelationships

Value of Historical Information

Information Considerations

Impact of new information on Price Movement

Portfolio Performance Evaluation

Monopolistic Access to Information

$$E\,[P_{t+1}|\phi\,t] = [1 + E(R_{t+1})\ |\ \phi_t]\,P_t$$

Capital Market Theory

Determinants of Value,
Value = f($ Return, Desired Return)

Portfolio Theory

Dividends and Growth

Risk - Return Measurement

Pure Returns and Risk Premiums

Utility Theory

suggests that only "insiders" appear to have monopolistic information and profit accordingly.

The crux of the EMH is that securities are always fairly priced and that expected and long-run actual returns rise only as one increases his risk exposure. Profitable trading rules will not work, and an optimal policy is to buy "the market", leverage yourself (per capital market theory) to the desired risk level, and hold.

## Implications of the Theory

There are two principal implications of the theory just developed which are quite useful and heavily relied upon in this study. These are:

1) According to capital market and portfolio theory the returns on any stock can be segregated into two components; a market factor and a stock-unique factor. On the average we expect the stock-unique factors to average zero in any one time period over many stocks and/or to average zero over many time periods for any single stock. We will use this notion of $\underline{e_i}$ (stock-unique values) to examine the nature of price movements around the split date. This is discussed in considerable detail later.
2) According to the EMH, returns on a security are commensurate only with the level of risk accepted. Abnormal profits are defined as those greater than those suggested by capital market theory. We will be able to use this notion to test whether one can develop profitable trading rules on reverse-split securities once the split has occurred.

## Economics of Reverse Stock Splits

Both logic and past writings on reverse splits indicate the following as possible justification(s) for reverse splits:

1) Marketability may be improved by inflating the per share price inasmuch as a wider range of potential investors may be attracted to the issue. As discussed in Chapter I, this idea has some rational appeal in that "dollar-stocks" or "penny-stocks" typically are not eligible for margin, tend to have a "bad reputation" in American markets, and are generally avoided by the more substantial individual investors and institutional investors. Marketability would tend to be improved as one considers transaction costs, and is certainly the case wherein the firm in question is contemplating a new equity issue.
2) A reverse split may well be a management signal to the investment community that the "corner has been turned", and, via a quasi-reorganization (or reorganization), improved performance is anticipated. It is logical to assume that management would not propose such a radical step unless it was convinced that past periods of poor performance will not be repeated in the future. If such were actually to be the case, the positive information content of a reverse split would be obvious.
3) The consolidation of the number of outstanding shares through a reverse split will reduce

stockholder servicing costs such as: expenses of the transfer agent, costs of printing and distributing interim reports to shareholders, cost of replacement certificates, cost of dividend distributions, etc. There is also the strong possibility that state franchise taxes would be reduced. Even though these savings are "real" in every sense of the word, it is unlikely that such savings -- even if known to the investing public -- will have any measurable impact upon share prices.

4) Reverse splitting shares for merger purposes is not unknown. In fact, this practice is rather well accepted as a workable administrative tool for merger purposes.[20] However, any price impact may be properly said to emanate from potential exchange benefits rather than from the reverse split itself.

Of the above four justifications for reverse splits only two are likely to be the basis of any measurable price changes: improved marketability of the shares, and implied information content of the reverse split.

## HYPOTHESES OF THE STUDY

In this study we examine the process by which common stock prices adjust to information (if any) that is inherent in a reverse split. We saw earlier that the only logical reasons for a reverse split to have an economic impact upon price appear to be:

a) by increasing the marketability of the shares by inflating the post-split price to a more favorable investment trading range; and

b) by management's making an implicit statement containing favorable (or unfavorable) information through the action of reverse splitting the shares.

By examining return behavior around the reverse split we can, hopefully, identify whether reverse splits carry any information, and, if so, how rapidly the market reacts to such information. As such the study represents an examination of both the value of the information conveyed by a reverse split, and of the semi-strong version of the EMH. To accomplish this, the study investigates the hypotheses which are outlined below.

## Major Hypothesis H-1

There is no evidence of unusual return behavior for reverse split stocks in the months around the effective date of the reverse split.

If this is found to be true it suggests; a) that there is no information content inherent in reverse splits; and b) that management does not reverse split shares only in periods of abnormal price behavior. If H-1 cannot be supported, we must look to various minor hypotheses for possible explanations.

### Minor Hypothesis H-1a

To the extent unusual price behavior exists, it begins considerably in advance of the reverse split date.

If this is found to be true, it suggests that the reverse split is not the cause of unusual price behavior prior to the split. If rejected, it suggests a possible causal link between reverse splits (cause) and price behavior (effect). Of course, this might be indicative of an information content inherent in reverse splits.

### Minor Hypothesis H-1b

Unusual price behavior persists after the effective date of the reverse split.

If this hypothesis is accepted, it suggests either; a) the reverse split carries no information content; or b) the information is positive or negative depending upon the "direction" of pre- and post-split returns. In either case, however, there might be a possibility of buying or selling reverse split shares to earn abnormal profits.[21] This is further investigated in the following minor hypothesis.

### Minor Hypothesis H-1c

Abnormal profits are not available by following a policy of consistently selling (or buying) reverse split shares at the time of the split and holding for one year.

If this hypothesis is supported we have one more piece of evidence in support of the EMH, and it would say something about the information value of reverse splits. If they do bear information value and the hypothesis is accepted, it would suggest that such information is instantaneously evaluated by the market and captured in price. If reverse splits do not bear information value, we should not expect abnormal profits. However, if the hypothesis is not supported it would appear that we will have developed a profitable trading rule, and found an instance of market inefficiency.

### Minor Hypothesis H-1d

Price behavior of reverse split stocks is the mirror image of the behavior of "normal" stock splits.

If this hypothesis is accepted, we can subscribe to the same conclusions suggested by FFJR[22] in their classic investigation of "normal" stock splits. If there is evidence of significant differences between the two studies, we must search for potential reasons for the existence of the differences.

## Major Hypothesis H-2

To the extent that unusual return behavior exists around the effective date of a reverse split, this behavior can be attributed to fundamental economic factors other than the reverse split.

If this hypothesis is accepted, it suggests that reverse splits have no meaningful economic impact upon prices. However, if we encounter unusual price (return) behavior which cannot be traced to other, more apparent, economic changes at the time of the split, it suggests that a reverse split does bear some information content. Major Hypothesis H-2 is not tested directly, but indirectly through a series of minor hypotheses which follow.

Each of the minor hypotheses examines the statistical relationship between an individual economic factor and reverse split price behavior. The following listing of potential behavior determinants is certainly not exhaustive. Hopefully, it is inclusive enough to capture any price behavior not attributable to the reverse split itself. As additional questions or potential determinants arise during the empirical analysis, they will, of course, be investigated even though not listed here.

### Minor Hypothesis H-2a

Price behavior both pre- and post-split is not affected by the fact that a company is, or is not, presently paying a dividend.

We would expect to accept this hypothesis if reverse splits bear no information content about potential future dividend policy. A priori logic would suggest that reverse splits are simply that -- an exchange of shares with no further information inherent in the transaction. However, if reverse splits do bear information this information might relate to future dividend streams. If we find that "non-dividend payer" price behavior differs significantly from "dividend payer" price behavior it would suggest a dividend policy information content inherent in reverse splits. In the case in which post-split price behavior of non-payers is significantly positive vis-a-vis the price behavior of dividend payers, it suggests positive dividend information to the holders of non-paying stocks. In the case in which post-split price behavior of non-payers is significantly negative vis-a-vis dividend payers, it suggests negative dividend information to holders of non-paying stocks.

If H-2a is not accepted, we must be very careful in making inferences about the relative advantages or disadvantages of reverse splits. For example, if post-split price behavior is relatively positive for non-payers we might conclude that managements of non-paying companies can increase the value of the firm simply by passing on seemingly favorable information to shareholders in the form of a reverse split. But unless prices stabilize at a new equilibrium level after the reverse split, which is above the pre-split level, there is no advantage to splitting. That is, for management to use the reverse split as a tool to affect the value of the firm, the price adjustment must be permanent and stabilized.

### Minor Hypothesis H-2b

Price behavior around the split date is independent as to whether post-split dividend payments are higher, lower, or the same as pre-split payments.

This hypothesis is the exact major test FFJR applied in their study of "normal" stock splits.[23] Their contention was that post-split price behavior should stabilize at a higher (lower) level if future dividends are increased (decreased). If the dividend payout remains the same, there should be no price impact. FFJR rejected this hypothesis for "normal" stock splits. That is, they accepted the fact that price behavior is controlled by post-split dividend policy, and, by inference, rejected the notion of any economic value inherent in the split itself. This hypothesis will be examined in the same vein.

The argument could be made that prices will adjust only if actual post-split dividend policy is different from expected policy. If a dividend policy change is anticipated by investors prior to the split date and is later varified by management, there should be no price adjustment. Thus, it could be argued that post-split prices will not be different as among each of the three different dividend policy alternatives (increase, no change, decrease) if such a policy change is anticipated by investors. Via this line of reasoning, we might see no impact on prices from changes in dividend policy, and thus H-2b will be very difficult to interpret.

The logic behind this argument in incomplete. Certainly investors price shares today based upon their expectations of tomorrow. But they also consider the uncertainty of such expectations. Until management actually declares a dividend policy change, investors will bear this uncertainty and adjust prices downward accordingly. If management declares a dividend policy change at the split date which is in line with investor expectations, prices will change -- not due to the expectations, but due to the resolution of uncertainty. Thus we would expect some price impact of declared policy changes after the split date regardless of pre-split expectations.

## Minor Hypothesis H-2c

Post-split price behavior is independent of the post-split price range of the security.

As indicated earlier in the study, an economic justification of reverse splits might lie in the area of increased marketability. The argument is essentially that investors have a preferred price range for securities which they might buy. The corporation can increase the number of potential buyers by splitting the shares so that the final price is within this range; the larger the number of buyers, the greater the inherent marketability of the issue. *Ceteris paribus*, increased marketability should lead to higher prices (lower demanded returns).

This hypothesis will be tested on a number of different post-split price ranges. If H-2c is accepted there is no apparent marketability benefit in a reverse split. However, if post-split price behavior is significantly *higher* for stocks in the higher final price categories, there would appear to be no marketability impact (or it was reflected prior to the split), and we must look elsewhere for explanations of the behavior.

## Minor Hypothesis H-2d

Post-split price behavior is independent of the exchange upon which a security is listed.

This hypothesis relates again to the question of marketability. Many professional investors believe that securities listed on the New York Stock Exchange are more marketable, other things being equal, than those listed on the American Stock Exchange. If we accept the hypothesis, there is some evidence that this is not true. If the hypothesis cannot be accepted, marketability differences between the exchanges might exist.

We must exercise extreme care, however, in assigning a causal variable (marketablity) if H-2d is not accepted. There are numerous other factors which may cause behavior. Nonetheless, the hypothesis is sufficiently interesting, aside from possible inferences which might be drawn, to warrant investigation.

### Minor Hypothesis H-2e

Post-split price behavior is independent of the reverse split ratio.

After a fashion, this hypothesis is similar to H-2d. It is interesting in and of itself, regardless of the explanatory factors. We shall not posit any explanatory variables here. This is done, as needed, in the analysis chapter.

### Minor Hypothesis H-2f

Post-split price behavior is independent of the time period in which the reverse split occurred.

The data here will be segregated into three different types of *market* time periods: Those in which overall market prices were rising, falling, or stable. Price behavior is examined in each of the three market states. If splits never contain information, we would expect to accept the hypothesis. But if the hypothesis is not accepted, there is an indication that investor attitudes toward reverse splits are dependent upon overall investor optimism or pessimism.

## Conclusions

To conclude, we must re-emphasize the fact that the above hypotheses might not be inclusive of all potential questions to be asked. However, they are among the major unknowns and deserve study. As new questions arise in the analysis chapter, they will be investigated. For ease of reference, each hypothesis is restated in the following table.

## Table 1

## Summary Restatement of Hypotheses

Major H-1: There is no evidence of unusual return behavior for reverse split stocks in the months around the effective date of the reverse split.

- Minor H-1a: To the extent unusual price behavior exists, it begins considerably in advance of the reverse split date.

- Minor H-1b: Unusual price behavior persists after the effective date of the reverse split.

- Minor H-1c: Abnormal profits are not available by following a policy of consistently selling (or buying) reverse split shares at the time of the split and holding for one year.

- Minor H-1d: Price behavior of reverse split stocks is the mirror image of the behavior of "normal" stock splits.

Major H-2: To the extent that unusual return behavior exists around the effective date of a reverse split, this behavior can be attributed to fundamental economic factors other than the reverse split.

- Minor H-2a: Price behavior both pre- and post-split is not affected by the fact that a company is, or is not, presently paying a dividend.

- Minor H-2b: Price behavior around the split date is independent as to whether post-split dividend payments are higher, lower, or the same as pre-split payments.

- Minor H-2c: Post-split price behavior is independent of the post-split price range of the security.

- Minor H-2d: Post-split price behavior is independent of the exchange upon which a security is listed.

- Minor H-2e: Post-split price behavior is independent of the reverse split ratio.

- Minor H-2f: Post-split price behavior is independent of the time period in which the reverse split occurred.

## THE DATA

The sample consists of 44 reverse splits occurring between January 1, 1960 and June 30, 1973. Securities were identified using Prentice-Hall Capital Adjustments (1969 volume and subsequent supplements thereto). Each of the securities in the sample meets all of the following criteria:

1. The security must be a common stock. The analysis does not include preferred stocks due to potential complications which might be encountered by considering securities which are fundamentally different from common stocks. While there were a number of preferred stocks which were reverse split during the period examined, these were excluded from the sample. Thus, the results of the study apply only to common stocks.
2. The security must be listed either on the American Stock Exchange or the New York Stock Exchange. This constraint assures that price data will be relatively accurate, continuous, and easily available. Over-the-counter stocks were not selected due to basic questions about the validity of published prices, and difficulty in finding continuous price histories.
3. Price data must be available for at least 30 consecutive months (during which time the reverse split will have occurred). This criterion simply assures an adequate price history from which inferences can be drawn.

4. A substantial merger did not take place during the 12 months immediately following the reverse split. This constraint eliminates all instances of reverse splits which were undertaken as a convenience for merger. A merger might so significantly change the basic characteristics of a firm that any comparison of pre- and post-split prices might not be a comparison of like securities.
5. No one individual or firm owns 50 percent or more of the outstanding shares. This will exclude from consideration all reverse splits which may have been consumated at the pleasure of a single individual (or firm) -- regardless of the rationale behind the reverse split.

A detailed description of the sample is presented in the empirical analysis chapter.

## STATISTICAL TESTS

Earlier in this chapter we saw that one of the implications of capital market theory and the efficient market hypothesis was that the events which cause returns on common stocks can be segregated into two components: events affecting all securities in the market, and events affecting only individual securities. Since we are interested in examining the price behavior of individual stocks which is associated with reverse split events, we must adjust for those other factors which influence the behavior of prices. In particular, we wish to separate price changes into the two above-mentioned components; returns due to market factors, and returns due to stock-unique factors. By controlling for overall market influences, we can focus our attention upon price behavior attributable only to stock-unique events.

A convenient way to accomplish this is via the capital asset pricing model:

$$R_{it} = \frac{P_{it} - P_{it-1} + D_{it}}{P_{it-1}} .$$

where: $P_{it}$ = the price of the ith stock at the end of month t adjusted for all capital changes;

$D_{it}$ = the cash dividend paid on the ith stock during month t; and

$R_{it}$ = the percentage return on the ith stock during month t.

It will be recalled from the earlier theoretical development, that the returns-generating process might well follow the simple model:

$$R_{it} = \alpha_i + \beta_i(R_{mt}) + e_{it} ;$$

where $\alpha_i$ and $\beta_i$ are parameters varying from security to security, $R_{mt}$ is the percentage return on the market during month t, and $e_{it}$ is a random disturbance term. It is essential that $e_{it}$ follow the assumptions of a classic linear regression model. That is:

$$E(e_{it}) = 0 ;$$

$$\mathrm{Var}(e_{it}) = \text{constant};$$

$$\mathrm{Cov}(e_{it}, e_{it+1}) = 0 \text{ ; and}$$

$$\mathrm{Cov}(e_{it}, e_{jt}) = 0 .$$

The return value, $R_{it}$, can be calculated as indicated above or by substituting logs for the price and dividend values. The only benefits of using logs are that log values may simplify calculations, and logs are a close approximation of continuously compounded returns. We will not use the log approach here. Results should be the same regardless of the manner in which returns are calculated since both methods lead to essentially the same return values.

Basically the analysis of price behavior involves an examination of the $e_{it}$ terms around the split date. Subtracting $\alpha_i$ and $\beta_i(R_{mt})$ from the basic return calculation we are left with stock-unique behavior only.

The procedure followed consists of seven steps which are outlined below.

First. --- Obtain monthly return values for both the reverse split securities and the market. Stock returns were calculated using month-end closing prices or the ask price if the stock in question was not traded on the last trading day of the month. The smallest number of return observations available was 30 for Cabol Enterprises (formerly Saphire Petroleum). The largest number, 164, was calculated for a number of securities. No adjustments were made for differential tax treatment of dividends, and transaction costs were ignored. The market is defined as Moody's Industrial Common Stocks -- End-of-Month Averages.[24] Moody's was selected because of the ease in obtaining relatively exact estimates of cash dividends paid in a given month on shares in the index.

Second. --- $\alpha_i$ and $\beta_i$ were estimated using a simple linear regression model. FFJR found strong evidence that the expected values of $e_{it}$ in months around the split date were positive.[25] We find the mirror image (negative expected values) of $e_{it}$ values in the sample of reverse splits. For these months the assumptions of the regression model (that $E(e_{it}) = 0$) are not met. To assure that estimates of $\alpha_i$ and $\beta_i$ are not subject to specification error these months around the split date have been excluded to eliminate the possibilities of such bias. FFJR found that 15 months was satisfactory for most purposes.[26] A close examination of their results indicates that the $e_{it}$ values began to "turn" significantly positive about 12 months prior to the split date. We have, therefore, excluded the 12 months preceding and following the split date in the estimation of $\alpha_i$ and $\beta_i$.

Third. --- For a given split, the month in which the effective date occurs is defined as month 0. The months preceding the split are defined as month -1, -2, -3, . . . etc. as we move away from the split date. Months following the split are defined as months +1, +2, +3, . . . etc. in the same fashion.

Fourth. --- For months in which $+13 < t < -13$, $\alpha_i$ and $\beta_i$ were estimated. Note again the holdout sample of 24 months bracketing the split month.

Fifth. --- The residual error term, $e_{it}$, was calculated for each of the 24 months surrounding the split month. Where:

$$e_{it} = R_{it} - [\alpha_i + \beta_i(R_{mt})];$$

$$-12 \leq t \leq +12.$$

Sixth. --- The average residual error term ($\underline{u_t}$) was calculated across all stocks for each of the 24 months. Where:

$$u_t = \frac{\sum_{i=1}^{N_t} e_{it}}{N_t} \; ;$$

$-12 \leq t \leq +12$ ; and

$N_t$ = number of stocks for which return observations are available in month $\underline{t}$.

Seventh. --- The cumulative average residual error term ($\underline{U_t}$) was calculated for each month starting with month -12, where:

$$U_t = \sum_{t=-12}^{m} u_t \text{ ; and}$$

$m$ = the month in which we are measuring the cumulative average error term.

This $\underline{U}_t$ term reflects the cumulative effects of the wanderings of returns of reverse split stocks from their normal market relationships.

The cumulative average residual error term ($\underline{U}$) is the focus of interest in this study. To test most of the hypotheses, the $\underline{U}_t$ term is categorized as belonging to different groups. For example when testing H-2c dealing with return behavior across different price levels of stocks, we calculate $\underline{U}_t$ for three different post-split price ranges: up to \$5.00, \$5.00 to \$15.00, and above \$15.00.

## Notes

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[2] K. H. Borch, The Economics of Uncertainty, (Princeton, N.J.: Princeton University Press, 1968).

[3] G. Debreau, Theory of Value: An Axiomatic Analysis of Economic Equilibrium, (New York: John Wiley and Sons, Inc., 1959).

[4] Milton Friedman and L. Savage, "The Utility Analysis of Choices Involving Risk," Journal of Political Economy, LVI (August, 1948), 279.

[5] J. W. Pratt, "Risk Aversion in the Small and in the Large," Econometrica, XXXVI (January, 1968), 122.

[6] John Von Neumann and Oskar Morgenstern, Theory of Games and Economic Behavior, (3rd ed.; Princeton,N.J.: Princeton University Press, 1953).

[7] William F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, XIX (September, 1964), 425.

[8] Michael C. Jensen, "Risk, the Pricing of Capital Assets, and the Evolution of Investment Portfolios," The Journal of Business of the University of Chicago, XLII (April, 1969), 167.

[9] E. F. Fama, "Perfect Competition and Optimal Production Decisions Under Uncertainty," The Bell Journal of Economics and Management Science, III (Autumn, 1972), 509.

[10] M. E. Blume and I. Friend, "A New Look at the Capital Asset Pricing Model," Journal of Finance, XXVII (March, 1973), 19.

[11] J. L. Evans and S. H. Archer, "Diversification and the Reduction of Dispersion: An Empirical Analysis," Journal of Finance, XXIII (December, 1968), 761-767.

[12] Harry Markowitz, "Portfolio Selection," Journal of Finance, VII (March, 1952), 77.

[13] This discussion essentially follows that by Michael C. Jensen, "Capital Markets: Theory and Evidence," The Bell Journal of Economics and Management Science, III (Autumn, 1972), 357.

[14] This schematic was suggested to the author by Professor Robert C. Radcliffe of the University of Florida.

[15] Fama (1970), p. 405.

[16] M. F. M. Osborne, "Brownian Motion in the Stock Market," Operations Research, VII (1959), 145.

[17] Paul H. Cootner, "Stock Prices: Random vs. Systematic Changes," Industrial Management Review, III (Spring, 1962), 24.

[18] M. C. Jensen and G. A. Bennington, "Random Walks and Technical Theories: Some Additional Evidence," Journal of Finance, XXV (May, 1970), 469-482.

[19] R. Ball and P. Brown, "An Empirical Evaluation of Accounting Income Numbers," Journal of Accounting Research, VI (Autumn, 1968), 159-170.

[20] For example see the merger of Roan Selection Trust (1962), Burroughs (J.P.) ane Son (1963), and Associated Brewing (1965).

[21] "Abnormal profits" are defined as a rate of return other than that offered by the "market" given the accepted level of risk.

[22] Fama, et al, p. 17.

[23] Fama, et al.

[24] Moody's Industrial Manual, (New York: Moody's Investors' Service, Inc.; 1973), a66 - a67.

[25] Fama, et al.

[26] Ibid.

# CHAPTER III
# RESULTS OF THE ANALYSIS

## Introduction

In this chapter we shall examine the results of the various statistical tests outlined in the previous chapter. The results of the analysis will be presented for each of the several hypotheses followed by a discussion of the significance of the findings.

Prior to the examination of the results, a detailed description of the sample is presented. From examination of various cross-sectional and distributional presentations we should be able to draw conclusions which will be useful during the examination of the formal tests and in drawing conclusions from the study as a whole. A detailed listing of the reverse split securities examined is presented in Table A-1 of the Appendix.

## DESCRIPTION OF THE SAMPLE

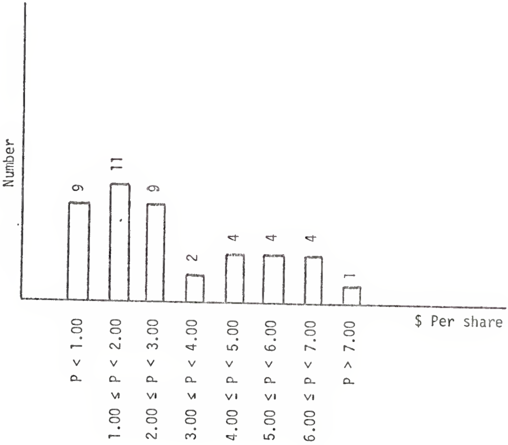
In this section the sample of 44 reverse split stocks is described in detail. Items of interest to be presented include distribution of pre- and post-split prices, split ratios, trend of splits, exchange listings, debt/equity ratios, market values, dividend history, and capital market model statistics.

### Prices of Reverse Split Stocks

A complete presentation of the prices of the reverse split stocks for months t=-1 and t=0 are presented in Table A-3 of the Appendix. It

FIGURE 5

Frequency Distribution of Prices at t = -1



should be noted that the range of prices at month t=-1 is from $0.25 for I T I Corporation (company number 05) to $9.625 for Wheelabrator-Frye International (company number 43). The average price for all stocks in the sample at month t=-1 is $2.86420, with a standard deviation of 2.20925. We note that the price of the average share listed on the New York Stock Exchange is $55.14, and the price of the average share listed on the American Stock Exchange is $22.44 (both prices as of June 30, 1973)[1].

Figure 5 presents the prices of the sample at month t=-1 in graphic form. Without the precision of an exact statistical measurement, there appears to be a definite positive skewness in the distribution of pre-split prices.

Prices of the sample stocks at month t=0 (a complete listing of which is also presented in Table A-3) average $10.79119 with a standard deviation of 2.20925. In this case the distribution appears fairly uniform although some "statistical" skewness may exist. This, in conjunction with the distribution of pre-split prices, suggests that management of the companies which reverse split their common stock may wish to place these securities in a more popular trading range, but certainly do not approach the average price of common shares of either of the two major exchanges. The range of post-split prices is from $2.25 for Prudential Funds (company number 40) to $27.375 for Wheelabrator-Frye (company number 43). Figure 6 presents the distribution of prices at month t=0 in graphic form.

## Split Ratios

The ratios of the reverse splits for the sample range from 1:2 for Great Basis Petroleum (company number 20) to 1:16 for Waltham

FIGURE 6

Frequency Distribution of Prices at t=0

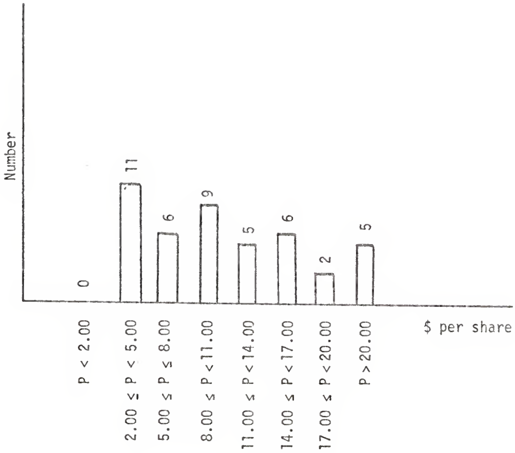
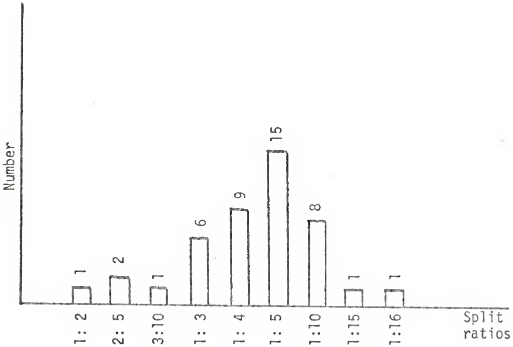


FIGURE 7

Frequency Distribution of Split Ratios



Precision Industries (company number 25). The average split ratio is 1:5.68932 (with a standard deviation of 3.26141). A complete listing of the reverse split ratios by company is found in Table A-2. Figure 7 presents the split ratios in graphic form. Here there is an interesting clustering of the values. One would expect (given the average split ratio) a large number of 1:5 ratios, but it is interesting to note the number of 1:4 reverse splits (9) and the number of 1:10 reverse splits (8). The higher reverse split ratios have no apparent connection with pre-split price inasmuch as the pre-split prices range from $0.6875 (Charan Industries; company number 16) to $6.125 (Surveyor Fund; company number 37).

## Trends in Reverse Splits

Table 2 presents the number of reverse splits by year together with the year-to-year return on Moody's (the "market") as measured by $R_m = \frac{P_{mt} - P_{mt-1}}{P_{mt-1}}$. Again, there appears to be no relationship between the number of reverse splits and the performance of the market inasmuch as $r = -.028$ indicating that the correlation is not statistically different from 0. Also noted in Table 2 is the exchange upon which the reverse splits occurred. Note that the only year in the study during which the number of reverse splits of New York Stock Exchange listed stocks exceeded the number of American Stock Exchange listed stocks was 1973 (to June, 30).

Figure 8 is a graphic representation of the "market" used in this study --- Moody's Industrial Common Stocks --- End-of-Month Averages. Table 3 defines market conditions and presents the number of reverse splits which occurred during the defined states of the market.

## TABLE 2

Number of Reverse Splits by Year Noting Market Return and Exchange of Listing

| Year | Number of Splits | Market Return | ASE[a] | NYSE [b] |
|---|---|---|---|---|
| 1960 | 1 | -10.34% | 1 | 0 |
| 1961 | 1 | +23.67 | 1 | 0 |
| 1962 | 3 | -10.15 | 3 | 0 |
| 1963 | 4 | +20.70 | 4 | 0 |
| 1964 | 8 | +14.99 | 7 | 1 |
| 1965 | 5 | +10.90 | 4 | 1 |
| 1966 | 4 | -17.78 | 3 | 1 |
| 1967 | 0 | +25.49 | 0 | 0 |
| 1968 | 3 | +05.73 | 3 | 0 |
| 1969 | 2 | -08.37 | 2 | 0 |
| 1970 | 0 | -00.25 | 0 | 0 |
| 1971 | 3 | +10.95 | 3 | 0 |
| 1972 | 4 | +17.49 | 3 | 1 |
| 1973[c] | 6 | -08.11 | 2 | 4 |

---

a) ASE = American Stock Exchange

b) NYSE = New York Stock Exchange

c) To June 30.

FIGURE 8

Moody's Industrial Common Stocks ---

End-of-month averages

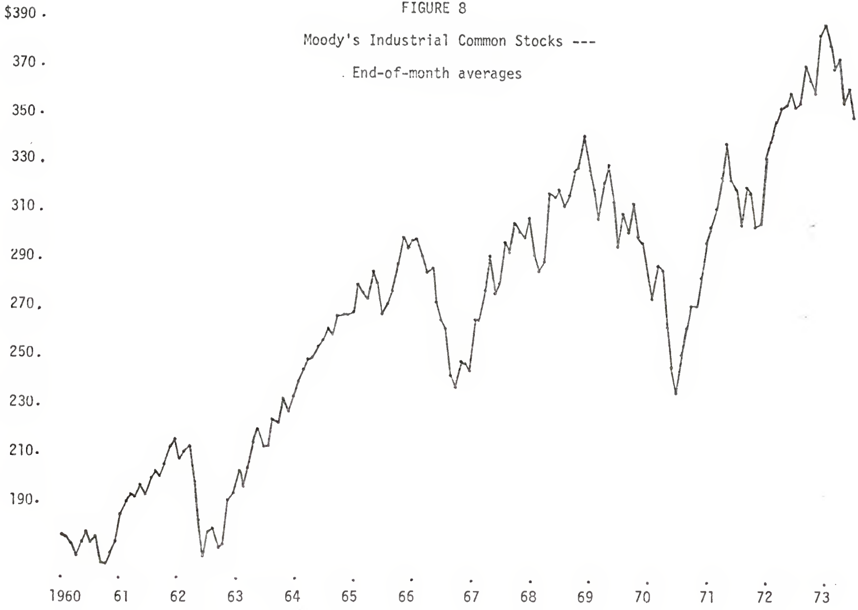


TABLE 3

Reverse Splits by Condition of the Market

| Begin | End | Market Condition | Number of Splits |
|---|---|---|---|
| January, 1960 | October, 1960 | "Sidewise" | 0 |
| November, 1960 | December, 1961 | Up | 3 |
| January, 1962 | June, 1962 | Down | 1 |
| July, 1962 | February, 1966 | Up | 20 |
| March, 1966 | September, 1966 | Down | 3 |
| October, 1966 | November, 1968 | Up | 1 |
| December, 1968 | June, 1970 | Down | 3 |
| July, 1970 | April, 1971 | Up | 1 |
| May, 1971 | November, 1971 | Down | 2 |
| December, 1971 | December, 1972 | Up | 4 |
| January, 1973 | June, 1973[a] | Down | 6 |

Summary:

| | | | |
|---|---|---|---|
| Total in Up Markets: | 29 | Average Per Year: | 3.702 |
| Total in Down Markets: | 15 | Average Per Year: | 3.999 |
| Total in "Sidewise" Markets: | 0 | Average Per Year: | 0.0 |

---

a) End of study period.

Conclusions to be drawn from Table 3 are confusing at best. Since the study at hand is concerned with reverse splits, one would expect results very different from those of studies of "normal" splits: "... that companies tend to split their shares during 'abnormally' good times --- that is, during periods of time when the prices of their shares have increased much more than would be implied by the normal relationships between their share prices and general market price behavior."[2] FFJR continue by observing that "... it is clear that for the exchange as a whole[3] the number of splits increases dramatically following a general rise in stock prices. Thus splits tend to occur during general "boom" periods, and the particular stocks that are split will tend to be those that performed 'unusually' well during the period of general price increase."[4]

From observations of the data in Table 3 we find little difference as to when reverse splits occur. The average of 3.702 per "bull" market year is somewhat lower than the average of 3.999 per "bear" market year, but not significantly so. The conclusion to be drawn from these data is that the "state of the market" has little influence upon the timing of reverse splits.

It should be remembered that the American Stock Exchange ruling on reverse splits (as discussed in Chapter I) occurred in 1968. No more than 13 splits could possibly be attributed to the 1968 AMX ruling.

### Exchange Listing

Table A-2 also identifies the exchange of record for each of the securities in the survey at the time of the reverse split. Many of the firms which were listed on the American Stock Exchange at the time of a reverse split have since been listed on the New York Stock Exchange.

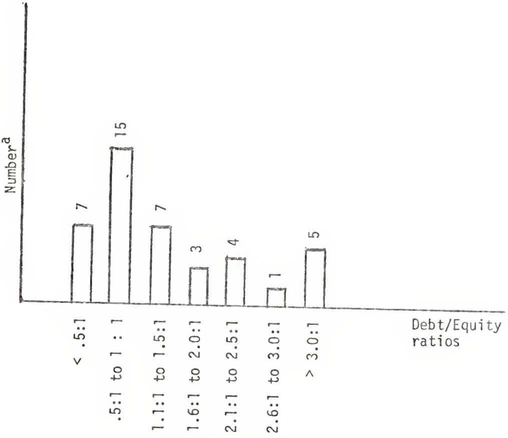
Of the 44 common stocks included in the study, only eight were listed on the New York Stock Exchange at the time of the reverse split.

## Debt/Equity Ratios

Table A-3 presents a listing of the Debt/Equity ratios of the companies in the sample. These data are remarkable in that they are

FIGURE 9

Frequency Distribution of Debt/Equity Ratios



a) Company number 04 omitted due to negative net equity values.

quite normal. Only one of the 44 companies in the survey proved to have a net deficit in the total equities accounts (company number 04, Hycon Manufacturing). Otherwise, the Debt/Equity ratios range from .02 for company number 29 (Canadian Merrill) to 12.8 for 1st S & L Shares (company number 38). Figure 9 is a graphic representation of the frequency distribution of the Debt/Equity ratios. It is noted that only five of the companies in the sample (numbers 09, 18, 21, 24, and 38) present a ratio of greater than 3:1. This indicates that the sample companies were not, in general, overburdened with debt. Quite the contrary inasmuch as fully half of the companies indicated Debt/Equity ratios of 1:1 or less.

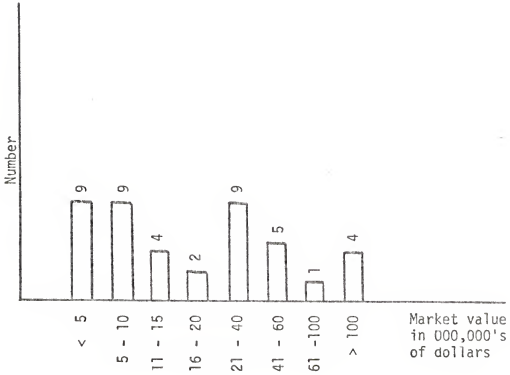
The average Debt/Equity ratio for the sample companies was found to be 1.63767:1 (with a standard deviation of 2.20333).

## Market Value of Equity

The range of market values for the total common equity structures of the various companies presents a picture which just about covers the spectrum of companies listed on the major exchanges except that there is not a firm with a total market value of the common equity in excess of $1,000,000,000. The market values range from a low of $1,260,000 for Charan Industries (company number 16) to $361,764,000 for Bunker-Ramo (company number 22). Table A-3 presents information of total common shares outstanding just prior to the reverse split and total market values based upon this number of shares and the market price at month t=-1. The average market value was found to be $38,829,327 (with a standard deviation of $70,769,600). Figure 10 is a graphic presentation of the frequency distribution of the market values. It is interesting to note that more than half of the firms

FIGURE 10

Frequency Distribution of Market Values



under examination (24 to be exact) fall into the less-than-$20,000,000 category. Of perhaps greater interest are those companies in the over-$100,000,000 category (company numbers 22, 37, 39, and 43). This frequency distribution seems to suggest that the smaller (and, perhaps, financially weaker) firms have the greater tendency to reverse split their shares. Such would appear to be the case from the data here.

## Dividend History

Of the companies in the sample slightly more than half (23) have paid a cash dividend at some time during the period of examination. Little can be inferred from this on the surface, but a formal test of the relative price performance of these categories (dividend-paying versus non-dividend-paying) of securities is presented later in the examination of Hypothesis H-2a.

## Market Model Statistics

Table 4 presents average statistics generated by the operation of the regression equations. As the data in this table indicate, the degree of correlation of returns of this group of stocks to the market is not of a very high order. As a consequence, many of the standard statistical tests which would be applicable to a more representative group of securities can not be meaningfully applied to this group of reverse split stocks.

The data in Table 4, however, will allow us to draw a few conclusions at this point. The average $\alpha$ value of -0.16946 leads to the rather astounding realization that --- since the relationships are averages of monthly values --- the purchase of these securities indicates a loss in the range of 200 percent (annualized) after adjusting for market risk.

TABLE 4

Summary of Statistics Generated by the Regression Equations

| Item Statistic | Average Value |
|---|---|
| $\alpha$ | -0.16946 |
| $\beta$ | +1.17342 |
| r | .26690 |
| Pre-Split Error $(\bar{\mu}_{ij} \leqq 0)$ | -0.02014 |
| Standard Deviation | 0.15537 |
| Post-Split Error $(\bar{\mu}_{ij} \geqq 0)$ | -0.01833 |
| Standard Deviation | 0.16442 |
| Standard Error of Estimate (Y) | .17856 |
| Standard Error of Estimate ($\alpha$) | .53321 |
| Standard Error of Estimate ($\beta$) | .52858 |

Figure 11 is a graphic presentation of the frequency distribution of the computed $\beta$'s. As can be seen from this chart the $\beta$'s are distributed rather symetrically around the 1.0 to 1.5 range. The total range of the $\beta$'s is from -2.82 for Atlas Consolidated Mining and Industrial (company number 44) to +2.68 for Bunker-Ramo (company 22). Any skewness appears to be toward the left, i.e. the lower end of the scale. Since the average $\beta$ is 1.17342 the skew toward the left is, in this case, a tendency toward the normal range. The average $\beta$ value (1.17342) is in excess of that of the average security, indicating that this sample of reverse split stocks is more risky than the market.

The average correlation coefficient ($\underline{\bar{r}}$) was calculated to be .26690 which is much less than that of the "average" security in the market. $\underline{r}^2$, the coefficient of determination, is a commonly-used statistical test to measure the reliability of relationships determined through regression analysis. In this case $\bar{\underline{r}}^2$ = .07124 which is much lower that the $\underline{r}^2$ of the average market model (approximately .30). Given the calculated values for $\bar{\underline{r}}$ and $\bar{\underline{r}}^2$, one is led to the rather obvious conclusion that the market plays little role in the determination of the returns of the sample stocks. Therefore, stock-unique events are most crucial (almost overwhelmingly so) in the determination of the performance of prices of these securities.

## RESULTS OF THE STUDY

In this section we shall examine each of the hypotheses in order as presented in Chapter II. As a convenience each of the hypotheses will be restated before delving into the results of the analysis. Finally, a discussion of the implications of the findings will be presented.

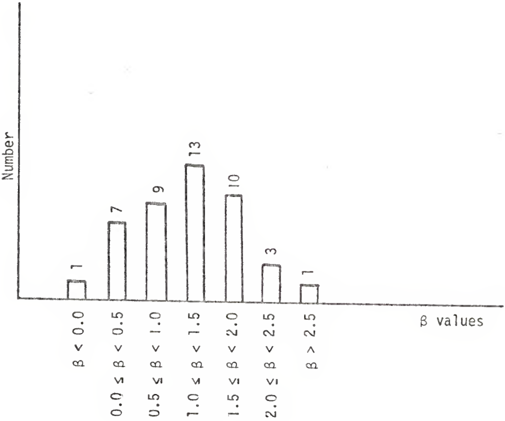
### Major Hypothesis H-1

There is no evidence of unusual return behavior for reverse split stocks in the months around the effective date of the reverse split.

Table 5 presents the average cumulative residual error term ($U_t$) for all stocks in the survey. This same data is presented graphically in Figure 12. The reader will note that the values for $U_t$ show a rather marked decline over time. At month t = -12 the value is -0.0426. This cumulative error term for all stocks declines rather steadily to month t = +12. The minimum value for $U_t$ is found to be -0.4709 occurring at month t = +9. This is the point of maximum price erosion for the shares taken as a whole over the period studied.

FIGURE 11

Frequency Distribution of β



## TABLE 5

## Analysis of Aggregate Cumulative Errors

| t= | N= | $U_t$ | $\sigma$ | $U_t$ per FFJR * |
|---|---|---|---|---|
| -12 | 41 | -0.0426 | 0.1204 | 0.0129 |
| -11 | 42 | -0.0574 | 0.1660 | 0.0228 |
| -10 | 43 | -0.0163 | 0.2426 | 0.0325 |
| - 9 | 44 | -0.0041 | 0.3570 | 0.0488 |
| - 8 | 44 | -0.0556 | 0.3378 | 0.0645 |
| - 7 | 44 | -0.0801 | 0.3304 | 0.0783 |
| - 6 | 44 | -0.0829 | 0.3490 | 0.0952 |
| - 5 | 44 | -0.1208 | 0.3826 | 0.1119 |
| - 4 | 44 | -0.0827 | 0.4057 | 0.1335 |
| - 3 | 44 | -0.1314 | 0.4497 | 0.1624 |
| - 2 | 44 | -0.1835 | 0.4524 | 0.1987 |
| - 1 | 44 | -0.2174 | 0.4240 | 0.2179 |
| 0 | 44 | -0.3233 | 0.4929 | 0.2247 |
| 1 | 44 | -0.3543 | 0.5101 | 0.2233 |
| 2 | 44 | -0.4107 | 0.5444 | 0.2264 |
| 3 | 42 | -0.3956 | 0.5818 | 0.2256 |
| 4 | 42 | -0.4139 | 0.5624 | 0.2256 |
| 5 | 40 | -0.3642 | 0.6419 | 0.2289 |
| 6 | 40 | -0.3940 | 0.6751 | 0.2287 |
| 7 | 38 | -0.4180 | 0.6983 | 0.2263 |
| 8 | 38 | -0.4516 | 0.6965 | 0.2251 |
| 9 | 38 | -0.4709 | 0.7125 | 0.2260 |
| 10 | 38 | -0.4688 | 0.7204 | 0.2252 |

TABLE 5 continued

| t= | N= | $U_t$ | σ | $U_t$ per FFJR * |
|---|---|---|---|---|
| 11 | 38 | -0.4539 | 0.7544 | 0.2255 |
| 12 | 36 | -0.4259 | 0.7979 | 0.2256 |

---

*Source: Fama et al, p. 10-11.

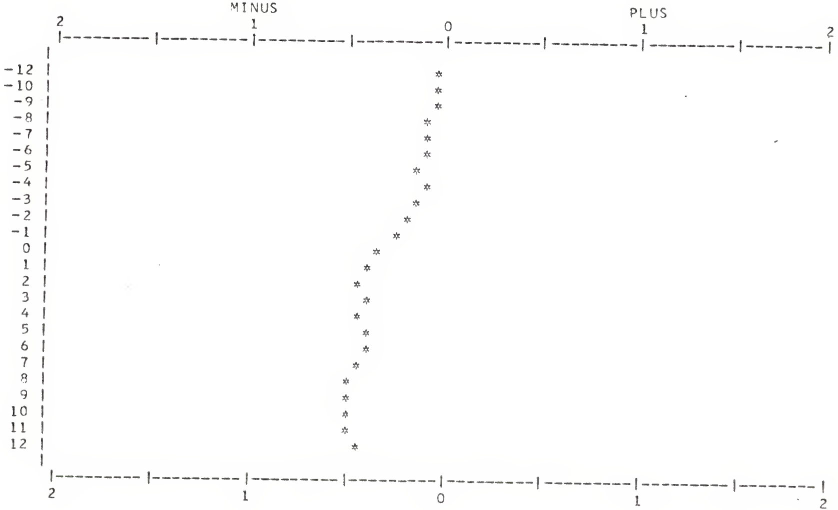
The returns (prices) appear to fail to stabilize --- reach a new equilibrium level --- during the 12-month post-split period (see Figure 12). This finding contrasts sharply with that of FFJR who determined that "... the cumulative average residuals rise dramatically up to the split month, but there is almost no further systematic movement thereafter."[5]

If nothing else, the apparent failure to reach a new equilibrium price serves to emphasize that we are dealing with a sample of securities which is radically different from that examined by FFJR.

There are, of course, outstanding exceptions to the general finding of non-stabilization of post-split prices. Surveyor Fund (company number 37) exhibits an almost perfectly stable price throughout the entire examination period. In fact, Surveyor Fund is the only company of the 44 studied which displayed price behavior which one would normally expect, ceteris parabus (see page 1 above). Surveyor Fund, however, is exactly that: a fund. This firm is a closed-end investment trust, and as such would normally be expected to trade at a price which is very close to its net asset value or at a price which is some rather fixed function of its net asset value.

FIGURE 12

CUMULATIVE ERROR FOR
ALLSTX



From observations of Table 5 and Figure 12 it is apparent that we cannot accept H-1. The rejection of this hypothesis suggests that there might be some information content inherent in a reverse split. However, it is impossible to determine with any degree of certainty if this is true by simply examining H-1. Specific tests for information content and marketability impact are performed later in this study. It should be apparent that if reverse splits do carry some "value" (positive or negative) an opportunity exists for management to engineer reverse splits for the purpose of artificially influencing price.

## Minor Hypothesis H-1a

To the extent unusual price behavior exists, it begins considerably in advance of the effective date.

The reader's attention is again directed to Table 5 and Figure 12. Whereas FFJR found that the cumulative average residuals were uniformly positive during the pre-split test period[6], we find that the cumulative average residuals are uniformly negative during this period. Such being the case, it must be concluded that the reverse split cannot be the cause of the abnormal price behavior --- certainly not in the more distant pre-split months. This suggests strongly that we should reject the notion that there is a cause and effect relationship as between a reverse split and price behavior occurring prior to the split.

## Minor Hypothesis H-1b

Unusual price behavior persists after the effective date of the reverse split.

Table 6 presents the cumulative average residuals for the post-split period only. It is again noted that the values are uniformly negative once again. Although the indicated price erosion is not so severe (on a relative basis) as during the pre-split period, nonetheless $U_t$ is negative throughout the entire period of examination. It is interesting to note the apparent "turn about" in months t = +10 to t = +12. The point of maximum price erosion is reached at month t = +9 (as discussed above; see Table 5 and Figure 12), and from this point the price behavior of the stocks is more favorable --- at least through the end of the test period. It is again noted, however, that the returns (prices) have yet to stabilize.

TABLE 6

Analysis of Average Cumulative Residuals --- Post-Split Only

| Month | N= | $U_t$ | $\sigma$ |
|---|---|---|---|
| 0 | 44 | -0.1059 | 0.4929 |
| +1 | 44 | -0.1369 | 0.5101 |
| +2 | 44 | -0.1933 | 0.5444 |
| +3 | 42 | -0.1782 | 0.5818 |
| +4 | 42 | -0.1965 | 0.5624 |
| +5 | 40 | -0.1468 | 0.6419 |
| +6 | 40 | -0.1766 | 0.6751 |
| +7 | 38 | -0.2006 | 0.6983 |
| +8 | 38 | -0.2342 | 0.6965 |
| +9 | 38 | -0.2535 | 0.7125 |
| +10 | 38 | -0.2514 | 0.7204 |
| +11 | 38 | -0.2365 | 0.7544 |
| +12 | 36 | -0.2085 | 0.7979 |

### Minor Hypothesis H-1c

Abnormal profits are not available by following a policy of consistently selling (or buying) reverse split shares at the time of the split and holding for one year.

The reader's attention is directed again to Table 6. It is again noted that $U_t$ is uniformly negative throughout the test period. Since $U_t$ is a reflection of price behavior, we find that price continues to be eroded --- and rather consistently --- during this period. At first it would appear that this hypothesis must be rejected simply from examination of Table 6. We must take note, however, of the values of the standard deviations. Even so, the fact that the behavior of prices in the post-split period is negative suggests that any information value which may be inherent in a reverse split is not instantly discounted by the market and captured by price. Further, it should be emphasized once again that prices fail to stabilize (contrary to the findings of FFJR[7]).

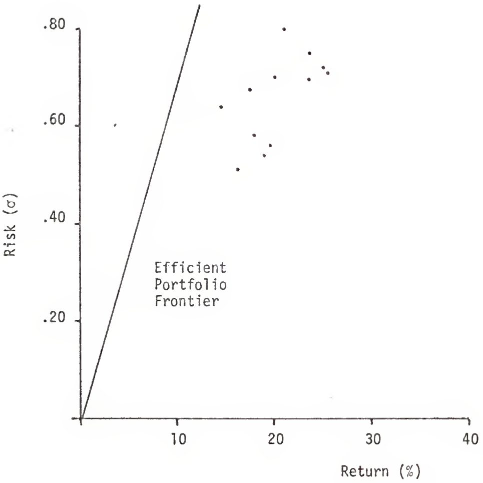
There is, thus, some indication of market inefficiency, and the possibility of the development of a profitable market trading rule.

A speculator may obtain abnormal profits only if he is able to realize greater returns than those offered by "the market" given the level of risk. We find here that abnormal profits may indeed be available by selling short reverse split stocks and maintaining such position for one year.

It is noted from examination of Figure 12 that the point of maximum price erosion (maximum profit point for the short seller) occurs at month t = +9. The speculator may wish to close out his position

FIGURE 13

Relationship of $U_t$ to Efficient Portfolio Frontier



(i.e. cover the short sale with a purchase of the security in like volume) much earlier than the end of one year. In fact, the differential profit to be gained after month t = +4 is rather small.

Figure 13 shows the relationship of post-split $U_t$ to an "Efficient Portfolio Frontier". This "frontier" was constructed from returns calculated on Moody's Industrial Common Stocks and an assumed risk-free return of 4 percent. $U_t$ is shown to consistently out perform the market even considering the very high levels of risk.

The implication here again concerns possible market inefficiency.

This hypothesis is rejected with caution. Even though some evidence that an example of market inefficiency has been found, the development of a profitable trading rule may be yet subject to serious question and is deserving of much more research than the scope of this paper allows.

### Minor Hypothesis H-1d

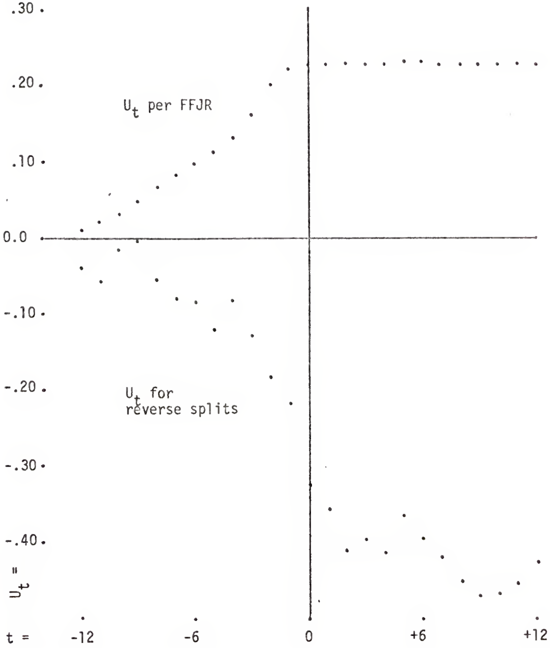
Price behavior of reverse split stocks is the mirror image of the behavior of "normal" stock splits.

Figure 14 represents a graphic comparison of the $U_t$ values from the FFJR study and this study. It is obvious that H-1d must be rejected. Even though the pre-split behavior of $U_t$ in this study is opposite that of the FFJR study, the post-split activity of returns is dramatically different. The post-split returns in the current study fail to stabilize as noted before. This point requires that we reject H-1d.

It is not possible to subscribe to the same conclusions suggested by FFJR concerning market efficiency. It was previously observed that

FIGURE 14

Comparison of $U_t$ Behavior with that of FFJR



this sample of stocks is at great variance with the sample examined by FFJR, and there is ample reason to expect results to be at great variance as well.

## Major Hypothesis H-2

To the extent that unusual return behavior exists around the effective date of a reverse split, this behavior can be attributed to fundamental economic factors other than the reverse split.

As stated in Chapter II, this Hypotheses is not to be directly tested, but rather is tested through a set of minor Hypotheses each of which examines a specific area of interest and wherein an explanation of unusual behavior may be found.

### Minor Hypothesis H-2a

Price behavior both pre- and post-split is not affected by the fact that a company is, or is not, presently paying a dividend.

Attention is directed to Tables 7 and 8 as well as Figures 15 and 16. The data presented reflects the behavior of $U_t$ for securities classified as either having or not having any pre-split cash dividend paying history during the period of the study. Of the 44 common stocks included in the survey only 17 had such dividend paying history.

The behavior of the average cumulative residuals of the 17 "dividend payers" is almost exactly the same as the behavior of the average cumulative residuals of the sample taken as a whole. That is: $U_t$ is uniformly negative throughout the 25-month test period; the point of maximum price erosion occurs at month t = +9; and the values of the standard deviations are high.

# TABLE 7

## ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR DIVYES

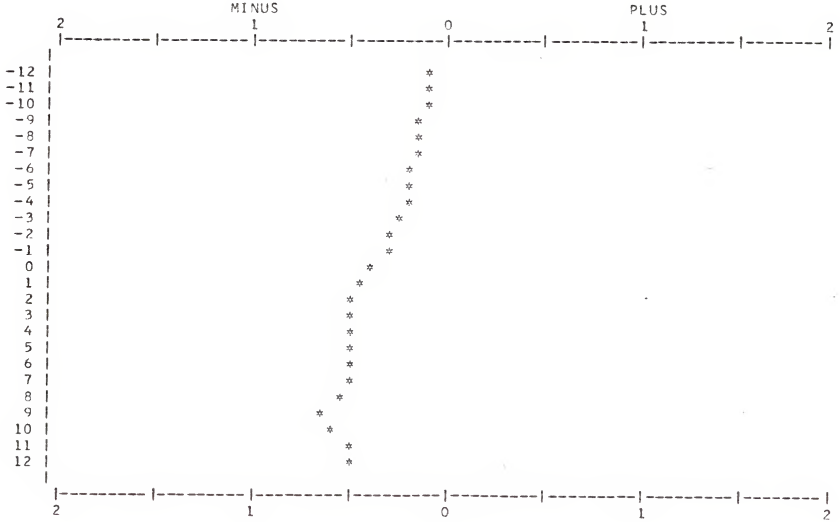
STOCKS IN THIS CATEGORY

1 8 11 12 13 14 16 22 28 30
37 38 39 40 41 43 45

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 17 | -0.0560 | 0.0837 |
| -11 | 17 | -0.0964 | 0.1107 |
| -10 | 17 | -0.0689 | 0.1563 |
| -9 | 17 | -0.1064 | 0.2141 |
| -8 | 17 | -0.1454 | 0.2507 |
| -7 | 17 | -0.1325 | 0.3347 |
| -6 | 17 | -0.1917 | 0.3332 |
| -5 | 17 | -0.1817 | 0.3542 |
| -4 | 17 | -0.1782 | 0.4030 |
| -3 | 17 | -0.2461 | 0.4448 |
| -2 | 17 | -0.2596 | 0.4670 |
| -1 | 17 | -0.2647 | 0.4690 |
| 0 | 17 | -0.3633 | 0.5597 |
| 1 | 17 | -0.4107 | 0.5879 |
| 2 | 17 | -0.4956 | 0.6185 |
| 3 | 15 | -0.4557 | 0.6544 |
| 4 | 15 | -0.4683 | 0.6174 |
| 5 | 15 | -0.4627 | 0.6281 |
| 6 | 15 | -0.4563 | 0.6623 |
| 7 | 13 | -0.4891 | 0.6022 |
| 8 | 13 | -0.5439 | 0.6728 |
| 9 | 13 | -0.6061 | 0.6770 |
| 10 | 13 | -0.5816 | 0.6503 |
| 11 | 13 | -0.4734 | 0.7423 |
| 12 | 12 | -0.4569 | 0.8138 |

FIGURE 15

CUMULATIVE ERRCR FOR
DIVYES



## TABLE 8

## ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR DIVNO

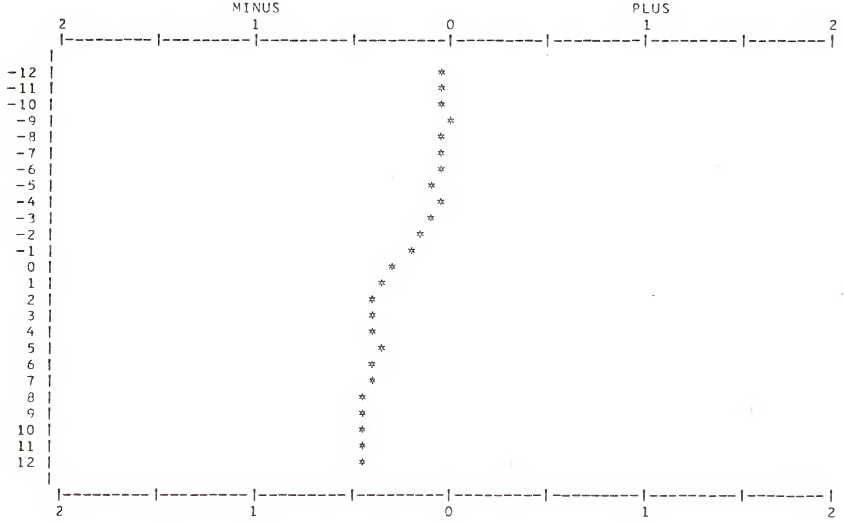
STOCKS IN THIS CATEGORY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3 | 4 | 5 | 6 | 7 | 9 | 10 | 15 | 17 |
| 18 | 19 | 20 | 21 | 23 | 24 | 25 | 26 | 27 | 29 |
| 31 | 32 | 34 | 35 | 36 | 42 | 44 | | | |

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 24 | -0.0331 | 0.1397 |
| -11 | 25 | -0.0310 | 0.1927 |
| -10 | 26 | 0.0182 | 0.2831 |
| -9 | 27 | 0.0603 | 0.4140 |
| -8 | 27 | 0.0009 | 0.3761 |
| -7 | 27 | -0.0471 | 0.3297 |
| -6 | 27 | -0.0143 | 0.3470 |
| -5 | 27 | -0.0825 | 0.4012 |
| -4 | 27 | -0.0226 | 0.4031 |
| -3 | 27 | -0.0593 | 0.4458 |
| -2 | 27 | -0.1355 | 0.4450 |
| -1 | 27 | -0.1877 | 0.3994 |
| 0 | 27 | -0.2981 | 0.4553 |
| 1 | 27 | -0.3187 | 0.4628 |
| 2 | 27 | -0.3573 | 0.4971 |
| 3 | 27 | -0.3623 | 0.5477 |
| 4 | 27 | -0.3836 | 0.5393 |
| 5 | 25 | -0.3051 | 0.6556 |
| 6 | 25 | -0.3563 | 0.6934 |
| 7 | 25 | -0.3811 | 0.7525 |
| 8 | 25 | -0.4035 | 0.7172 |
| 9 | 25 | -0.4006 | 0.7338 |
| 10 | 25 | -0.4101 | 0.7603 |
| 11 | 25 | -0.4437 | 0.7757 |
| 12 | 24 | -0.4104 | 0.8071 |

FIGURE 16

CUMULATIVE ERROR FOR DIVNO



Much the same may be said for the behavior of $U_t$ for the 37 "non-dividend paying" securities. However, the point of maximum price erosion for this latter category of common stocks is reached at month $t = +11$, and $U_t$ is not uniformly negative throughout the test period. Months $t = -10$, $-9$, and $-8$ display a positive $U_t$ for the non-paying stocks although the standard deviation for these three months is significantly higher than for the corresponding three months of the "dividend paying" category. The reader will have noted that these positive values are rather small (e.g. $U_t$ for month $t = -8$ is only $+0.0009$), but the significant difference as to sign of $U_t$ must be noted. It must also be noted that this difference as to sign of $U_t$ is short-lived.

The point of maximum interest here is that the value of $U_t$ for the "non-dividend paying" stocks is positive relative to that of the "dividend paying" stocks. In fact, $U_t$ is relatively positive uniformly throughout the 25-month test period. Further, the value of the standard deviations for the non-paying category is smaller for months $t = -2$ through $t = +5$ as well as for the single months $t = -7$ and $t = +12$.

On the basis of the relative differences in the performance of $U_t$ of these categories of securities one may be tempted to conclude that a reverse split is a positive signal to the market for non-paying stocks. Detailed analysis of the data reveals, however, that of the 37 non-paying stocks only two initiated dividend payments within one year after the effective date of the reverse split.

If hypothesis H-2a is to be rejected (as the discussion thus far would indicate) great caution must be exercised in drawing any inferences as to advantages of reverse splits. Given that the performance of $U_t$ for non-paying stocks is relatively positive vis-a-vis the dividend payers, the results of the analysis suggests that the dividend information content of a reverse split is positive for non-paying stocks. However, as discussed previously, further analysis of available data indicates otherwise. Therefore, one must examine whether or not management can increase the value of the firm (at least on a relative basis) by simply decreasing the number of shares outstanding.

The FFJR study discussed extensively in Chapter I has disproved the notion of increasing the value of the firm by simply increasing the number of outstanding shares, and the evidence here must lead to the same conclusion so far as decreasing the number of outstanding shares is concerned. If the value of the firm is to be increased, the prices of the securities must reach an equilibrium level which is above the pre-split equilibrium level. The data here indicate that such is certainly not the case with reverse split securities. The prices erode quite severely during the 25-month test period, and even though the prices of the non-paying category of stocks appear to be more stable during the later months of the test period than the prices of the dividend paying stocks, any stability of prices may be said to be somewhat illusory.

In sum, analysis of the data here is somewhat contradictory. There are apparent differences in the relative performances of $U_t$ of these categories of reverse split stocks. These differences, though quite small on the whole, are nonetheless apparent. Conclusions based upon analysis of the differences in the ralative performance of $U_t$ is mitigated by the very large values of the standard deviations --- at some points nearly twice the value of the variable under examination. It is the high standard deviations which mitigate against drawing any firm conclusions as to dividend information value of reverse splits. We have repeatedly seen the constant erosion of prices of these securities over the test period, and thus cannot subscribe to the idea that the value of the firm can be positively affected simply by reducing the number of outstanding common shares. Therefore, H-2a is accepted.

### Minor Hypothesis H-2b

Price behavior around the split date is independent as to whether post-split dividend payments are higher, lower, or the same as pre-split payments.

At this point the author attempted to duplicate the major tests of FFJR[8] and Barker[9]. Some difficulty was encountered in that so few of the securities in the sample were paying a dividend at the time of the reverse split. Of the 44 stocks in the sample only 17 had any cash dividend history during the period studied (see above). Further, at the time of the reverse split, only 12 of the 44 had paid any cash dividends whatsoever in the year previous to the reverse split. Of this group of stocks, all but three increased the cash dividend payout during the year after the reverse split (company number 08 increased the cash dividend rate two months pre-split). Company numbers 10 and 44, which had no pre-split cash dividend history, commenced cash dividend payments during the year following the reverse split. Thus, 11 companies increased dividend payments during the year immediately following the split. The remaining 33 stocks either had no pre-split cash dividend history (25) or made no change in the payout rate (8).

The reader's attention is directed to Tables 9 and 10 and Figures 17 and 18. These data are the analysis of the $U_t$ for the categories "dividends increased" and "no change." Overall, there is little difference between two categories. $U_t$ indicates a rather severe price decline over time, and, again, the size of the standard deviations is quite large.

Closer analysis of the data indicates that the size of $U_t$ for the "dividends increased" category is much smaller than for the "no change" classification, and the values of the standard deviations also tend to be smaller. One is also struck by the fact that the "dividends increased" stocks display a $U_t$ which is positive for five of the first six months of the test period. Further, the relative size of the average cumulative residual is quite small until month $t = 0$ at which time the size of the average residual becomes rather large, and the returns become very unstable. $U_t$ continues to increase (become a larger negative number) rather consistently until month $t = +9$ at which point it reverses its trend. This is the same pattern noted in the analysis of Major Hypothesis H-1 (see Table 5 and Figure 12) wherein we examined the entire sample of 44 securities.

The "no change" classification of stocks (more than 75 per cent of which never paid a dividend prior to the reverse split) displays a $U_t$ which is uniformly negative throughout the entire 25-month examination period. As mentioned previously both $U_t$ and the standard deviations tend to be significantly larger. This tendency is very marked during the pre-split months, but this basic difference becomes very blurred as one examines the later post-split time periods. In fact, there is little real difference in the relative values of $U_t$ as

## TABLE 9

## ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR DIVINC

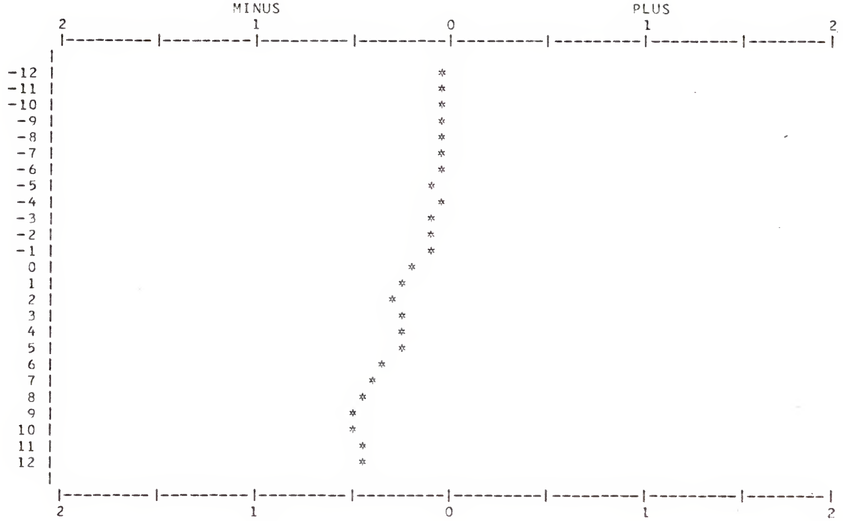
STOCKS IN THIS CATEGORY

10 11 14 22 28 30 37 38 43 44
45

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 11 | 0.0073 | 0.0998 |
| -11 | 11 | -0.0262 | 0.1567 |
| -10 | 11 | 0.0064 | 0.1119 |
| -9 | 11 | 0.0232 | 0.2018 |
| -8 | 11 | 0.0331 | 0.2422 |
| -7 | 11 | 0.0029 | 0.3139 |
| -6 | 11 | -0.0132 | 0.3047 |
| -5 | 11 | -0.0591 | 0.3279 |
| -4 | 11 | -0.0316 | 0.3545 |
| -3 | 11 | -0.0636 | 0.3488 |
| -2 | 11 | -0.0737 | 0.3533 |
| -1 | 11 | -0.0907 | 0.3933 |
| 0 | 11 | -0.1850 | 0.4493 |
| 1 | 11 | -0.2118 | 0.5185 |
| 2 | 11 | -0.2872 | 0.5388 |
| 3 | 10 | -0.2063 | 0.5049 |
| 4 | 10 | -0.2227 | 0.5281 |
| 5 | 10 | -0.2498 | 0.5569 |
| 6 | 10 | -0.3394 | 0.5851 |
| 7 | 10 | -0.3790 | 0.6073 |
| 8 | 10 | -0.4199 | 0.6593 |
| 9 | 10 | -0.4681 | 0.6038 |
| 10 | 10 | -0.4572 | 0.6427 |
| 11 | 10 | -0.4003 | 0.6574 |
| 12 | 9 | -0.4212 | 0.7198 |

FIGURE 17

CUMULATIVE ERROR FOR
DIVINC



## TABLE 10

### ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR DIVN/C

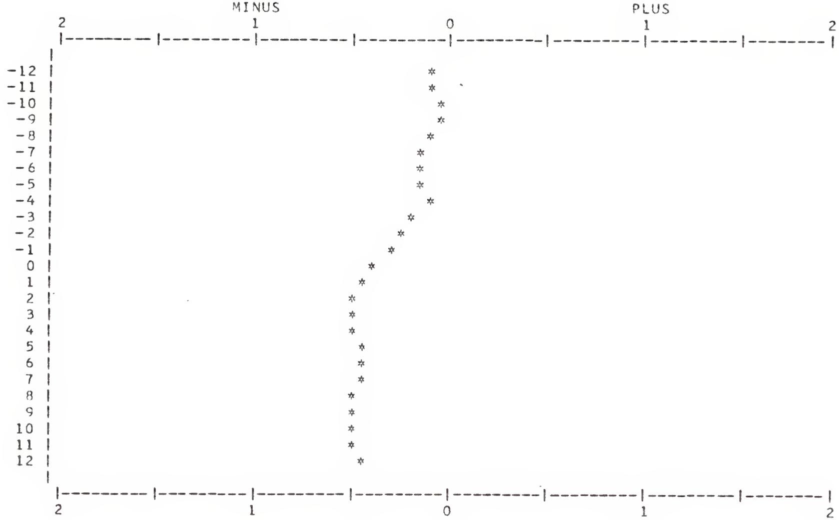
STOCKS IN THIS CATEGORY

1 2 3 4 5 6 7 8 9 12
13 15 16 17 18 19 20 21 23 24
25 26 27 29 31 32 34 35 36 39
40 41 42

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 30 | -0.0608 | 0.1236 |
| -11 | 31 | -0.0685 | 0.1703 |
| -10 | 32 | -0.0241 | 0.2747 |
| -9 | 33 | -0.0132 | 0.3977 |
| -8 | 33 | -0.0852 | 0.3624 |
| -7 | 33 | -0.1077 | 0.3358 |
| -6 | 33 | -0.1061 | 0.3639 |
| -5 | 33 | -0.1414 | 0.4017 |
| -4 | 33 | -0.0998 | 0.4250 |
| -3 | 33 | -0.1540 | 0.4812 |
| -2 | 33 | -0.2201 | 0.4800 |
| -1 | 33 | -0.2597 | 0.4311 |
| 0 | 33 | -0.3694 | 0.5046 |
| 1 | 33 | -0.4017 | 0.5063 |
| 2 | 33 | -0.4519 | 0.5482 |
| 3 | 32 | -0.4548 | 0.5988 |
| 4 | 32 | -0.4736 | 0.5673 |
| 5 | 30 | -0.4023 | 0.6722 |
| 6 | 30 | -0.4122 | 0.7108 |
| 7 | 28 | -0.4320 | 0.7379 |
| 8 | 28 | -0.4629 | 0.7206 |
| 9 | 28 | -0.4719 | 0.7577 |
| 10 | 28 | -0.4729 | 0.7572 |
| 11 | 28 | -0.4730 | 0.7965 |
| 12 | 27 | -0.4275 | 0.8352 |

FIGURE 18

CUMULATIVE ERROR FOR
DIVN/C



between these classifications of reverse split securities in the later post-split months particularly as one examines the values of $U_t$ in light of the size of the standard deviations.

As mentioned in Chapter II, FFJR rejected a hypothesis similar to this one. They found that post-split price behavior was determined to a large measure by post-split dividend policies[10]. Like conclusions have been posited by Barker[11]. Given the data here one is obliged to accept the Hypothesis at least on an overall basis. Pre-split return behavior is significantly different, but the difference disappears during the post-split period.

### Minor Hypothesis H-2c

Post-split price behavior is independent of the post-split price range of the security.

For this portion of the analysis the securities have been divided into categories as follows: a) those stocks with a price at t = 0 of \$5.00 or less; b) those stocks with a price at t = 0 greater than \$5.00 but less than \$15.00; and c) those stocks with a price at t = 0 greater than \$15.00. Data for these classifications of securities are presented in Tables 11, 12, 13, and Figures 19, 20, and 21.

The reader will note that $U_t$ for the first category of securities (\$5.00 per share and less) is uniformly negative throughout the 25-month examination period, and the values of the standard deviations during the later post-split months are extremely high. Prices of these securities are severely eroded during the earlier periods reaching a low point at month t = +4. It should be noted that the size of $U_t$ at t = +4 for this classification --- -0.6373 --- is greater than for any other category of sample securities at any time.

## TABLE 11

### ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR T=0<5

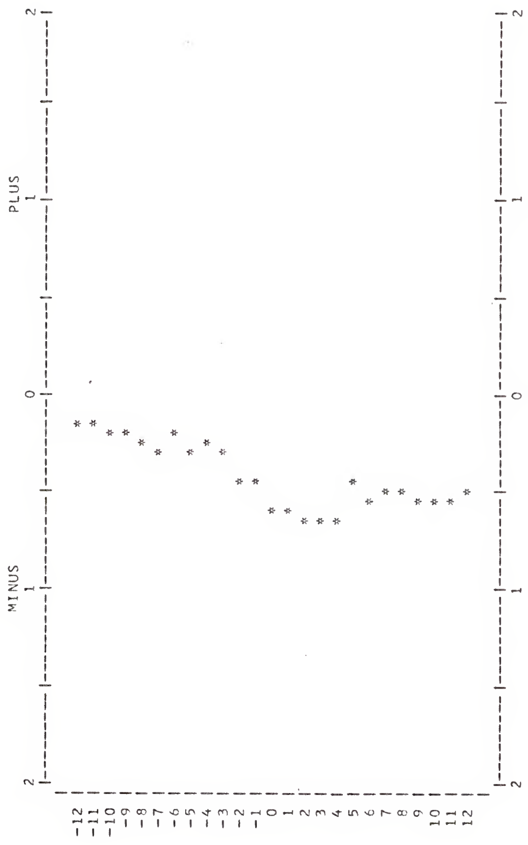
STOCKS IN THIS CATEGORY

5 6 8 9 16 18 21 25 29 40
42

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 10 | -0.1341 | 0.0940 |
| -11 | 11 | -0.1038 | 0.1421 |
| -10 | 11 | -0.1629 | 0.1799 |
| -9 | 11 | -0.1855 | 0.2920 |
| -8 | 11 | -0.2024 | 0.3579 |
| -7 | 11 | -0.2704 | 0.2915 |
| -6 | 11 | -0.1998 | 0.3967 |
| -5 | 11 | -0.2544 | 0.4334 |
| -4 | 11 | -0.2263 | 0.5150 |
| -3 | 11 | -0.2834 | 0.5654 |
| -2 | 11 | -0.4283 | 0.5601 |
| -1 | 11 | -0.4233 | 0.4478 |
| 0 | 11 | -0.5510 | 0.5570 |
| 1 | 11 | -0.5795 | 0.4511 |
| 2 | 11 | -0.6263 | 0.5416 |
| 3 | 11 | -0.6025 | 0.6529 |
| 4 | 11 | -0.6373 | 0.5397 |
| 5 | 11 | -0.4460 | 0.7654 |
| 6 | 11 | -0.5122 | 0.8157 |
| 7 | 10 | -0.4876 | 0.8736 |
| 8 | 10 | -0.4888 | 0.8340 |
| 9 | 10 | -0.5110 | 0.8710 |
| 10 | 10 | -0.5116 | 0.8664 |
| 11 | 10 | -0.5049 | 0.8148 |
| 12 | 10 | -0.4820 | 0.8708 |

FIGURE 19

CUMULATIVE ERROR FOR
T=0<5



## TABLE 12

## ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR T=0<15

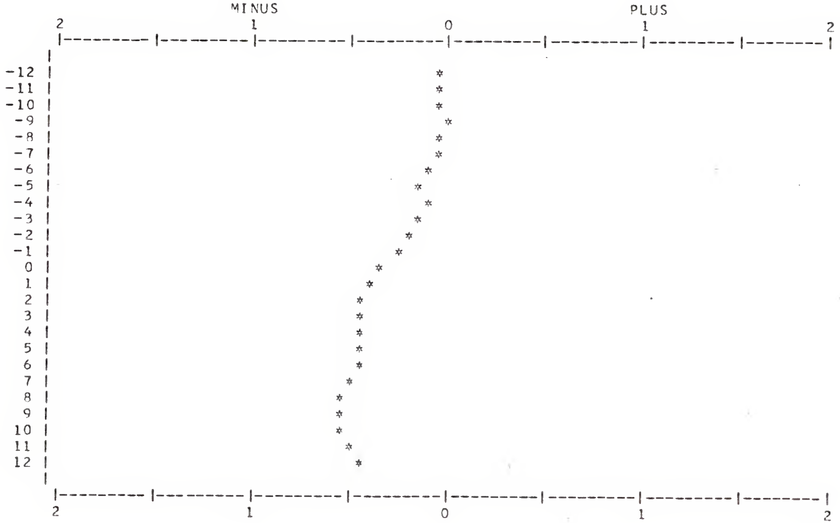
STOCKS IN THIS CATEGORY

1 2 3 4 7 12 13 14 15 20
22 23 26 27 30 31 32 34 35 36
44 45

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 20 | -0.0135 | 0.1262 |
| -11 | 20 | -0.0279 | 0.1933 |
| -10 | 21 | 0.0499 | 0.2780 |
| -9 | 22 | 0.0945 | 0.4181 |
| -8 | 22 | 0.0057 | 0.3548 |
| -7 | 22 | -0.0466 | 0.3256 |
| -6 | 22 | -0.0695 | 0.3305 |
| -5 | 22 | -0.1026 | 0.3764 |
| -4 | 22 | -0.0698 | 0.3601 |
| -3 | 22 | -0.1496 | 0.3912 |
| -2 | 22 | -0.1680 | 0.3914 |
| -1 | 22 | -0.2245 | 0.3913 |
| 0 | 22 | -0.3177 | 0.4498 |
| 1 | 22 | -0.3612 | 0.5017 |
| 2 | 22 | -0.4163 | 0.5236 |
| 3 | 20 | -0.4003 | 0.5368 |
| 4 | 20 | -0.4091 | 0.5348 |
| 5 | 18 | -0.4033 | 0.6222 |
| 6 | 18 | -0.4387 | 0.6911 |
| 7 | 18 | -0.4795 | 0.7137 |
| 8 | 18 | -0.5118 | 0.7294 |
| 9 | 18 | -0.5295 | 0.7326 |
| 10 | 18 | -0.5355 | 0.7916 |
| 11 | 18 | -0.4968 | 0.8749 |
| 12 | 17 | -0.4328 | 0.9253 |

FIGURE 20

CUMULATIVE ERROR FOR
T=0<15



## TABLE 13

## ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR T=0>15

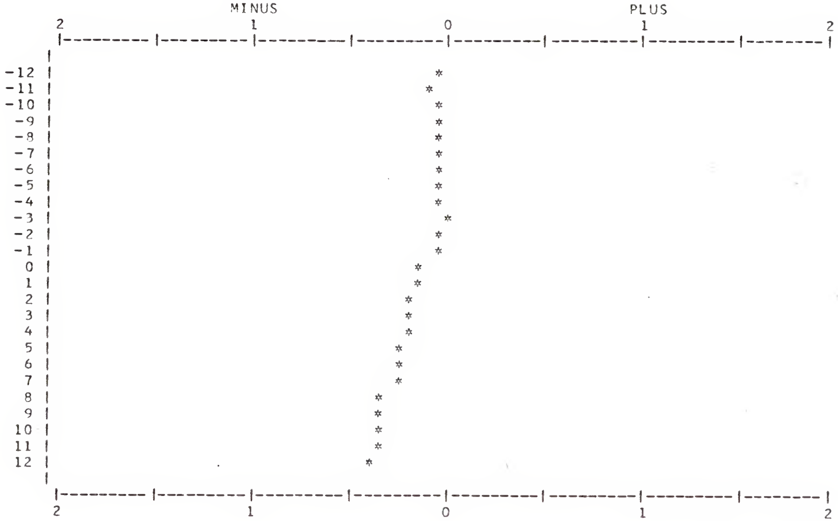
STOCKS IN THIS CATEGORY

10 11 17 19 24 28 37 38 39 41
43

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 11 | -0.0123 | 0.0933 |
| -11 | 11 | -0.0647 | 0.1182 |
| -10 | 11 | 0.0042 | 0.1645 |
| -9 | 11 | -0.0198 | 0.1942 |
| -8 | 11 | -0.0315 | 0.2559 |
| -7 | 11 | 0.0434 | 0.3205 |
| -6 | 11 | 0.0074 | 0.3353 |
| -5 | 11 | -0.0236 | 0.3369 |
| -4 | 11 | 0.0351 | 0.3629 |
| -3 | 11 | 0.0568 | 0.4043 |
| -2 | 11 | 0.0303 | 0.3576 |
| -1 | 11 | 0.0025 | 0.3885 |
| 0 | 11 | -0.1068 | 0.4483 |
| 1 | 11 | -0.1151 | 0.5176 |
| 2 | 11 | -0.1841 | 0.5456 |
| 3 | 11 | -0.1804 | 0.5623 |
| 4 | 11 | -0.1991 | 0.5968 |
| 5 | 11 | -0.2183 | 0.5742 |
| 6 | 11 | -0.2026 | 0.4905 |
| 7 | 10 | -0.2378 | 0.4798 |
| 8 | 10 | -0.3059 | 0.5111 |
| 9 | 10 | -0.3253 | 0.5314 |
| 10 | 10 | -0.3058 | 0.3985 |
| 11 | 10 | -0.3256 | 0.4531 |
| 12 | 9 | -0.3506 | 0.4578 |

FIGURE 21

CUMULATIVE ERROR FOR
T=0>15



Of the 11 stocks in this classification it was found that seven had prices at t = -1 of $1.00 or less (see Table A-3 of the Appendix) which may account for the relatively poor performance of this group of securities. Possibly the market believes "... once a dollar stock --- always a dollar stock."

The 22 securities in the second post-split price classification show an overall performance similar to that of the lower-priced group. However, $U_t$ for months t = -10, -9, and -8 is positive for this category. The point of maximum price erosion for this group is at month t = +10, and once again the large size of the standard deviations must be noted.

Of the 22 securities in this category of post-split prices, 15 had prices at month t = -1 greater than $1.00 but less than $4.00 (see Table A-3 of the Appendix). The somewhat higher average pre-split price of this group of securities may account for any observable difference in relative performance during the pre-split period. During the post-split period, and in terms of overall performance of returns during the 25-month examination period, there is virtually no difference in the behavior of post-split prices of those stocks priced at or below $5.00 per share and those priced greater than $5.00 but less than $15.00 per share.

The final classification of securities here are those with a price at t = 0 greater than $15.00 per share. Herein some significant differences are observed. During the pre-split examination period seven months display $U_t$ with a positive value. In fact, $U_t$ does not become consistently negative until month t = 0.

Aside from the relatively positive price performance of this classification of post-split prices, it is interesting to note the size of the standard deviation relative to the standard deviations of the other price groups. The values of the standard deviations for this category of stocks are generally much lower than for any other classification or cross section of the sample securities.

It appears as if we have found differences arising from relative marketability. The price behavior of stocks with a post-split price greater than $15.00 per share is relatively positive to other post-split price classifications. This tends to give weight to the argument that investors have a preferred price range in which they trade.

As noted above, $U_t$ for this price classification does not become uniformly negative until month t= 0. Post-split return behavior for this category appears somewhat more stable than other post-split price ranges examined. From examination of Figure 21 we find that there is virtually no consistent movement of $U_t$ during the pre-split period. During the post-split examination period, price erosion seems to occur in stages (i.e. month t = 0; month t = +2; month t = +8; and month t = +12). It should be noted that $U_t$ for this price category trends downward throughout the entire examination period.

From analysis of the data here H-2c must be rejected. Post-split price behavior does not appear to independent of post-split price range.

### Minor Hypothesis H-2d

Post-split price behavior is independent of the exchange upon which a security is listed.

Tables 14 and 15 present the values of the average cumulative error term for those stocks listed on the New York Stock Exchange and the

## TABLE 14

## ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR NYSE

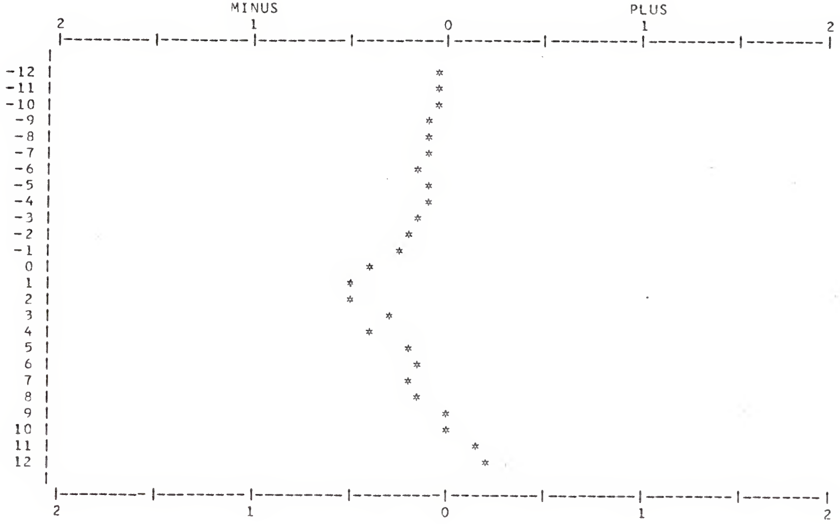
STOCKS IN THIS CATEGORY

13 15 17 22 31 35 37 39

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 8 | 0.0255 | 0.1062 |
| -11 | 8 | 0.0187 | 0.1417 |
| -10 | 8 | -0.0247 | 0.1341 |
| -9 | 8 | -0.0655 | 0.1324 |
| -8 | 8 | -0.0933 | 0.1592 |
| -7 | 8 | -0.0541 | 0.1388 |
| -6 | 8 | -0.1082 | 0.1415 |
| -5 | 8 | -0.0921 | 0.2254 |
| -4 | 8 | -0.0933 | 0.2718 |
| -3 | 8 | -0.1344 | 0.3210 |
| -2 | 8 | -0.1803 | 0.3054 |
| -1 | 8 | -0.2146 | 0.3721 |
| 0 | 8 | -0.3701 | 0.4568 |
| 1 | 8 | -0.4601 | 0.5165 |
| 2 | 8 | -0.4629 | 0.4991 |
| 3 | 7 | -0.2849 | 0.4968 |
| 4 | 7 | -0.3637 | 0.4846 |
| 5 | 5 | -0.1924 | 0.4304 |
| 6 | 5 | -0.1008 | 0.4361 |
| 7 | 4 | -0.1813 | 0.4239 |
| 8 | 4 | -0.1144 | 0.4336 |
| 9 | 4 | 0.0673 | 0.2892 |
| 10 | 4 | 0.0535 | 0.2749 |
| 11 | 4 | 0.2014 | 0.5360 |
| 12 | 4 | 0.2576 | 0.6215 |

FIGURE 22

CUMULATIVE ERROR FOR
NYSE



## TABLE 15

ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR AMX

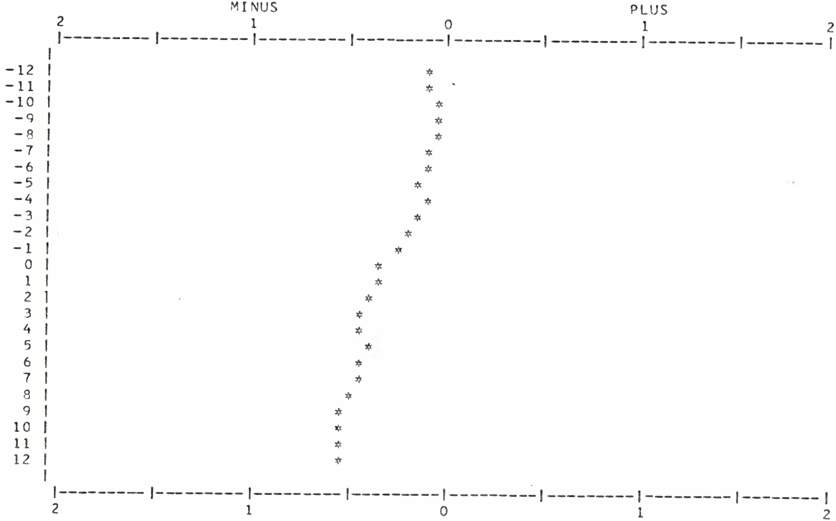
STOCKS IN THIS CATEGORY

1 2 3 4 5 6 7 8 9 10
11 12 14 16 18 19 20 21 23 24
25 26 27 28 29 30 32 34 36 38
40 41 42 43 44 45

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 33 | -0.0591 | 0.1192 |
| -11 | 34 | -0.0754 | 0.1681 |
| -10 | 35 | -0.0143 | 0.2627 |
| -9 | 36 | 0.0096 | 0.3898 |
| -8 | 36 | -0.0472 | 0.3670 |
| -7 | 36 | -0.0858 | 0.3607 |
| -6 | 36 | -0.0772 | 0.3813 |
| -5 | 36 | -0.1272 | 0.4117 |
| -4 | 36 | -0.0803 | 0.4329 |
| -3 | 36 | -0.1308 | 0.4773 |
| -2 | 36 | -0.1842 | 0.4824 |
| -1 | 36 | -0.2181 | 0.4395 |
| 0 | 36 | -0.3129 | 0.5061 |
| 1 | 36 | -0.3308 | 0.5130 |
| 2 | 36 | -0.3992 | 0.5599 |
| 3 | 35 | -0.4178 | 0.6014 |
| 4 | 35 | -0.4239 | 0.5825 |
| 5 | 35 | -0.3887 | 0.6678 |
| 6 | 35 | -0.4359 | 0.6971 |
| 7 | 34 | -0.4459 | 0.7230 |
| 8 | 34 | -0.4912 | 0.7151 |
| 9 | 34 | -0.5342 | 0.7227 |
| 10 | 34 | -0.5302 | 0.7335 |
| 11 | 34 | -0.5310 | 0.7442 |
| 12 | 32 | -0.5113 | 0.7833 |

FIGURE 23

CUMULATIVE ERROR FOR
AMX



American Stock Exchange respectively. The same data is presented graphically in Figures 22 and 23. It is noted that the performance of those securities listed on the American Stock Exchange is distinctly lower in terms of price (return) than that of those stocks listed on the New York Stock Exchange. It must be emphasized, however, that there are but eight stocks in the sample which were listed on the New York Stock Exchange at the time of the reverse split. These are company numbers: 13, 15, 17, 22, 31, 35, 37, and 39.

In addition to the small size of this sample of stocks it should be noted that the post-split prices of these stocks were (without exception) in either the middle or highest price category (see Minor Hypothesis H-2c above). Therefore any conclusions drawn from the data here must be mitigated by conclusions regarding post-split price behavior as a function of post-split price range.

It is of further interest to note that only one of the New York Stock Exchange listed stocks (company number 13) had an aggregate market value of the common equity of less than $40,000,000; and of the eight New York Stock Exchange listed securities, three had aggregate market values of the common equity in excess of $100,000,000.

It is very important to note that the behavior of $U_t$ during the post-split period for New York Stock Exchange listed securities is totally unique for all classifications of securities included in this study. Note that $U_t$ is positive and increasingly so from month t = +9 to the end of the examination period. No other category of reverse split stocks displays an even faintly similar behavior of $U_t$. Even given the size of the standard deviations in the later post-split months this group of New York Stock Exchange listed securities displays totally unique behavior.

From the data presented above H-2d must be rejected in that there are significant differences in post-split price behavior apparently dependent upon exchange listing. During the pre-split period there appears to be little difference between NYSE and AMX return behavior. From month t = 0 to month t = +2 the NYSE stocks show relatively negative returns, but from month t = +3 to the end of the post-split period the returns of NYSE stocks are relatively positive vis a vis AMX stocks. Furthermore, as noted earlier, returns for NYSE stocks become absolutely positive at month t = +9 and remain so.

One is tempted to conclude that post-split price behavior is a function of exchange listing. There are, however, several factors which must force a qualification of such conclusion. As mentioned previously price range or total market value of the common equity may be very significant variables at work here.

The answer to the question of relative marketability as among exchanges is somewhat beyond scope of this study, but from the analysis here there appear to be differences.

Minor Hypothesis H-2e

Post-split price behavior is independent of the reverse split ratio.

The analysis here divided the stocks into three groups: those with reverse split ratios of less than 1:4; those with ratios of 1:4 and 1:5; and those with reverse split ratios of 1:10 and greater. Tables 16, 17, and 18 along with Figures 24, 25, and 26 present the results of this phase of the analysis.

The differences observed as between the first two categories of reverse split ratios are rather minor. The $U_t$ term does not offer much difference to choose from, however these differences become somewhat more meaningful as one examines the standard deviations for these two classi-

## TABLE 16

### ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR SP2&3

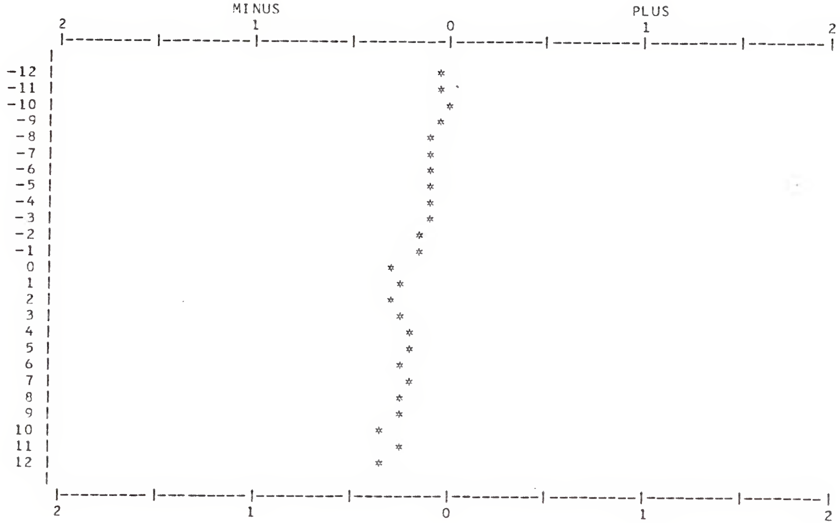
STOCKS IN THIS CATEGORY

1 8 15 20 24 30 35 40 43

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 9 | -0.0430 | 0.1077 |
| -11 | 9 | -0.0465 | 0.1803 |
| -10 | 9 | 0.0571 | 0.2515 |
| -9 | 9 | 0.0225 | 0.2878 |
| -8 | 9 | -0.0581 | 0.2697 |
| -7 | 9 | -0.0540 | 0.3610 |
| -6 | 9 | -0.0783 | 0.3977 |
| -5 | 9 | -0.0723 | 0.4085 |
| -4 | 9 | -0.0707 | 0.4919 |
| -3 | 9 | -0.0963 | 0.5839 |
| -2 | 9 | -0.1469 | 0.5408 |
| -1 | 9 | -0.1279 | 0.5542 |
| 0 | 9 | -0.2757 | 0.6151 |
| 1 | 9 | -0.2458 | 0.6246 |
| 2 | 9 | -0.2732 | 0.6489 |
| 3 | 8 | -0.2296 | 0.7247 |
| 4 | 8 | -0.1715 | 0.5505 |
| 5 | 7 | -0.1930 | 0.5476 |
| 6 | 7 | -0.2110 | 0.5944 |
| 7 | 6 | -0.1935 | 0.6395 |
| 8 | 6 | -0.2171 | 0.6251 |
| 9 | 6 | -0.2300 | 0.6336 |
| 10 | 6 | -0.3454 | 0.5900 |
| 11 | 6 | -0.2420 | 0.4348 |
| 12 | 5 | -0.3494 | 0.5036 |

FIGURE 24

CUMULATIVE ERROR FOR
SP2&3



## TABLE 17

### ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR SP4&5

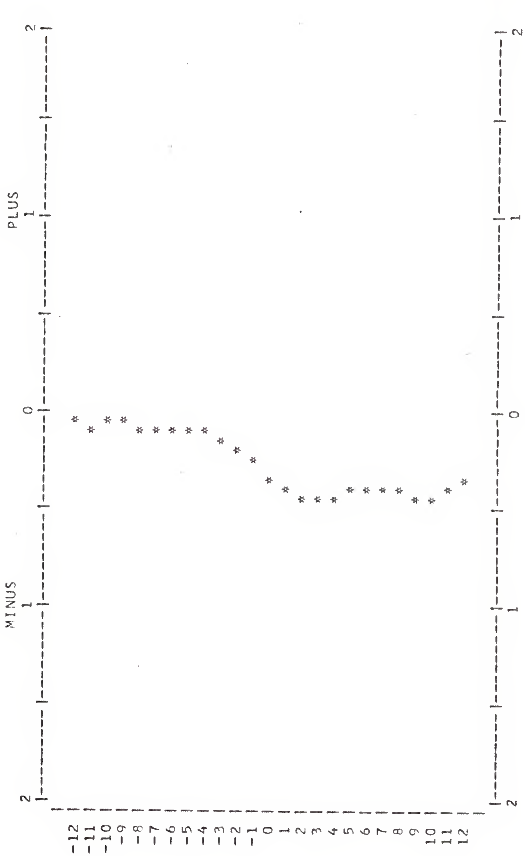
STOCKS IN THIS CATEGORY

2 3 4 6 7 10 11 12 13 14
16 17 18 22 23 28 29 31 32 36
37 38 41 42 45

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 23 | -0.0185 | 0.1290 |
| -11 | 24 | -0.0796 | 0.1657 |
| -10 | 24 | -0.0226 | 0.2673 |
| -9 | 25 | 0.0063 | 0.4207 |
| -8 | 25 | -0.0663 | 0.3802 |
| -7 | 25 | -0.0668 | 0.3634 |
| -6 | 25 | -0.0637 | 0.3558 |
| -5 | 25 | -0.0860 | 0.3643 |
| -4 | 25 | -0.0724 | 0.3889 |
| -3 | 25 | -0.1091 | 0.4183 |
| -2 | 25 | -0.1571 | 0.4324 |
| -1 | 25 | -0.2287 | 0.3872 |
| 0 | 25 | -0.3302 | 0.4702 |
| 1 | 25 | -0.3789 | 0.4995 |
| 2 | 25 | -0.4398 | 0.5314 |
| 3 | 24 | -0.4044 | 0.5596 |
| 4 | 24 | -0.4257 | 0.5854 |
| 5 | 23 | -0.3738 | 0.6084 |
| 6 | 23 | -0.3659 | 0.6235 |
| 7 | 23 | -0.3612 | 0.5982 |
| 8 | 23 | -0.3995 | 0.6223 |
| 9 | 23 | -0.4174 | 0.6400 |
| 10 | 23 | -0.4018 | 0.6668 |
| 11 | 23 | -0.3907 | 0.7370 |
| 12 | 22 | -0.3025 | 0.7548 |

FIGURE 25

CUMULATIVE ERROR FOR SP4&5



## TABLE 18

## ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR SP10+

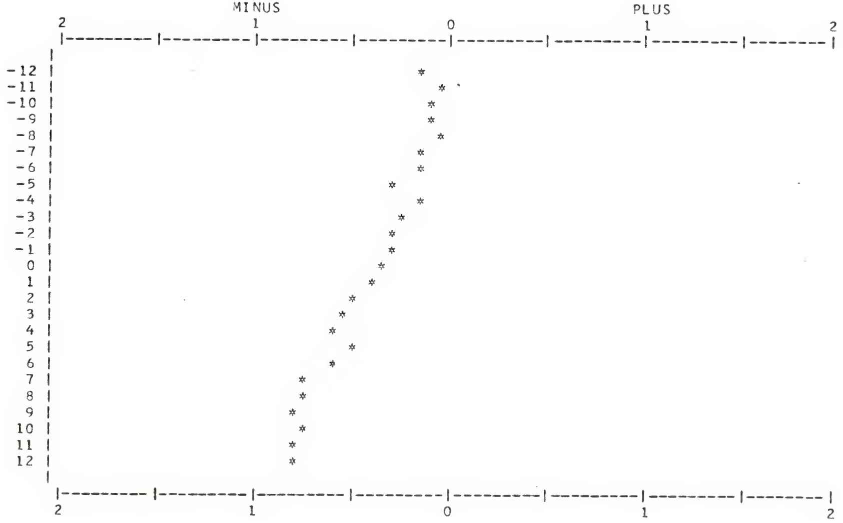
STOCKS IN THIS CATEGORY

5 9 19 21 25 26 27 34 39 44

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 9 | -0.1037 | 0.0960 |
| -11 | 9 | -0.0093 | 0.1602 |
| -10 | 10 | -0.0671 | 0.1659 |
| -9 | 10 | -0.0540 | 0.2435 |
| -8 | 10 | -0.0267 | 0.3061 |
| -7 | 10 | -0.1366 | 0.2209 |
| -6 | 10 | -0.1350 | 0.3155 |
| -5 | 10 | -0.2516 | 0.4155 |
| -4 | 10 | -0.1192 | 0.4072 |
| -3 | 10 | -0.2189 | 0.4306 |
| -2 | 10 | -0.2823 | 0.4528 |
| -1 | 10 | -0.2699 | 0.4181 |
| 0 | 10 | -0.3487 | 0.4814 |
| 1 | 10 | -0.3902 | 0.4649 |
| 2 | 10 | -0.4618 | 0.5144 |
| 3 | 10 | -0.5074 | 0.5429 |
| 4 | 10 | -0.5793 | 0.4962 |
| 5 | 10 | -0.4620 | 0.8045 |
| 6 | 10 | -0.5868 | 0.8483 |
| 7 | 9 | -0.7130 | 0.9330 |
| 8 | 9 | -0.7410 | 0.8892 |
| 9 | 9 | -0.7682 | 0.9053 |
| 10 | 9 | -0.7220 | 0.9290 |
| 11 | 9 | -0.7566 | 0.9338 |
| 12 | 9 | -0.7702 | 0.9920 |

FIGURE 26

CUMULATIVE ERROR FOR
SP10+



fications. The standard deviations for the 1:4 and 1:5 reverse split stocks are almost uniformly higher than similar values for those stocks reverse split with a ratio of less than 1:4.

The most marked difference in relative return (price) performance comes with the examination of the final category of reverse split ratios; 1:10 and greater. Here one may observe significant differences both as to the $U_t$ term and the value of the standard deviations. Not only does the $U_t$ indicate a much greater relative price erosion, but the values of the standard deviations are exceptionally high.

Caution must be exercised in the assignment of any causal relationship between split ratios and price behavior. Closer examination of the data of individual companies reveals that four (of a total of nine) had post-split prices at month $t = 0$ of less than $5.00. It is therefore possible that the price performance of this group of reverse split stocks is influenced to a greater extent by the performance of a price category of securities rather than what is being examined here.

Hypothesis H-2e must be rejected. It would appear that this hypothesis fails due to factors other than what we are attempting to examine here. However, the evidence is rather clear that stocks with the higher reverse split ratios tend to fare worse in terms of price than those with the lower split ratios. Again, this could well be a function of post-split price, and not the split ratio.

### Minor Hypothesis H-2f

Post-split price behavior is independent of the time period in which the reverse split occurred.

The reader's attention is directed to Table 3 and Figure 8 above. Table 3 segregates the movements of the market into three phases: a) periods during which the market was moving up; b) periods during which the market was moving down; and c) periods during which the market was moving essentially sidewise. Data for this portion of the analysis was divided into two categories. Inasmuch as no reverse splits occurred during periods when the market was in a "sidewise" state, we are left with two groups of securities. The first group of stocks was reverse split during what were essentially "bull" markets. This group consists of 32 securities. The remaining 12 stocks were reverse split during "bear" market phases.

Tables 19 and 20 along with Figures 27 and 28 present the data used in the analysis of this Hypothesis.

Contrary to a priori reasoning, the category of stocks which were reverse split during periods of general market increases performed more poorly overall than the counterpart classification which were reverse split during downward phases of the market. The former category ("bull" market splits) indicates that maximum price erosion occurs at month $t = +11$. The average cumulative residual is uniformly negative throughout the 25-month examination period, and once again we note the large size of the standard deviations.

The second category ("bear" market splits) show a positive $U_t$ at months $t = -10$ and $-9$. These securities show a relatively positive price performance vis a vis "bull" market splits. Further, this relative price performance is significantly different even as one takes into account the rather large standard deviations. It should be noted that the returns during the later post-split months for this group of "bear" market splits is highly unstable. In fact, this group displays the most unstable behavior of average residuals of all classifications of securities in the study.

## TABLE 19

## ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR MKTUP

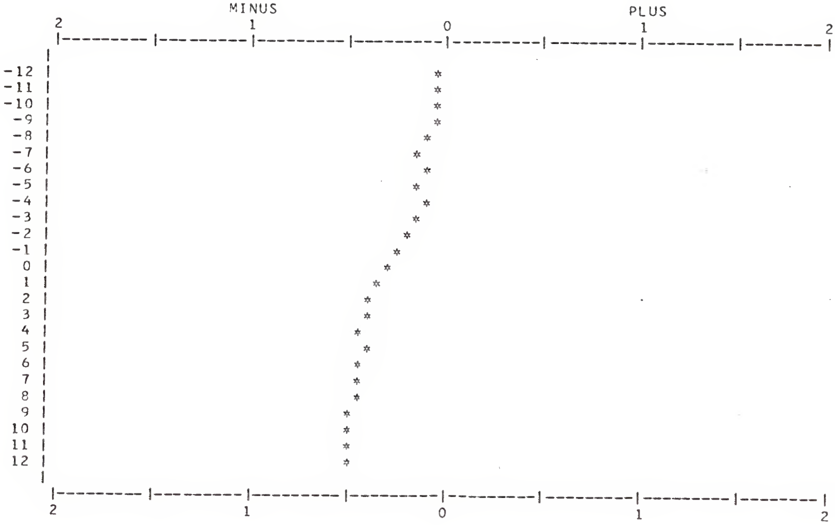
STOCKS IN THIS CATEGORY

2 3 4 5 6 8 9 10 11 12
14 15 16 17 18 19 20 21 23 24
25 26 27 28 32 36 37 41 42 43
44 45

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 30 | -0.0328 | 0.1184 |
| -11 | 31 | -0.0411 | 0.1758 |
| -10 | 31 | -0.0278 | 0.1962 |
| -9 | 32 | -0.0154 | 0.2881 |
| -8 | 32 | -0.0692 | 0.2679 |
| -7 | 32 | -0.1068 | 0.2782 |
| -6 | 32 | -0.0803 | 0.3081 |
| -5 | 32 | -0.1243 | 0.3504 |
| -4 | 32 | -0.0829 | 0.3872 |
| -3 | 32 | -0.1204 | 0.4406 |
| -2 | 32 | -0.1987 | 0.4498 |
| -1 | 32 | -0.2185 | 0.4240 |
| 0 | 32 | -0.2924 | 0.4563 |
| 1 | 32 | -0.3361 | 0.5044 |
| 2 | 32 | -0.3723 | 0.5580 |
| 3 | 32 | -0.3704 | 0.5833 |
| 4 | 32 | -0.4115 | 0.6025 |
| 5 | 32 | -0.3932 | 0.6955 |
| 6 | 32 | -0.4158 | 0.7222 |
| 7 | 32 | -0.4218 | 0.7365 |
| 8 | 32 | -0.4462 | 0.7277 |
| 9 | 32 | -0.4575 | 0.7426 |
| 10 | 32 | -0.4594 | 0.7518 |
| 11 | 32 | -0.4853 | 0.7720 |
| 12 | 30 | -0.4684 | 0.8090 |

FIGURE 27

CUMULATIVE ERROR FOR MKTUP



## TABLE 20

### ANALYSIS OF AGGREGATE CUMULATIVE ERROR FOR MKTDN

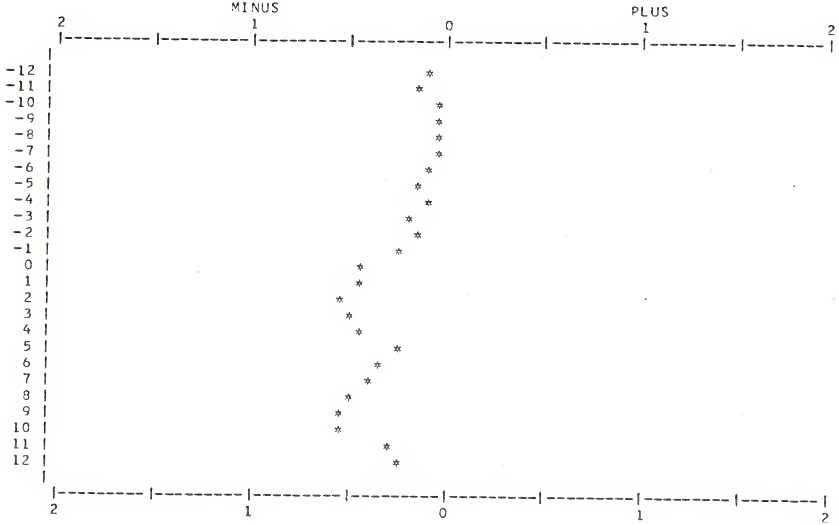
STOCKS IN THIS CATEGORY

1 7 13 22 29 30 31 34 35 38
39 40

| MONTH | NO. STOCKS | AVERAGE | STD DEV |
|---|---|---|---|
| -12 | 11 | -0.0694 | 0.1276 |
| -11 | 11 | -0.1035 | 0.1308 |
| -10 | 12 | 0.0137 | 0.3442 |
| -9 | 12 | 0.0262 | 0.5127 |
| -8 | 12 | -0.0192 | 0.4916 |
| -7 | 12 | -0.0087 | 0.4483 |
| -6 | 12 | -0.0897 | 0.4566 |
| -5 | 12 | -0.1115 | 0.4756 |
| -4 | 12 | -0.0822 | 0.4698 |
| -3 | 12 | -0.1607 | 0.4920 |
| -2 | 12 | -0.1430 | 0.4767 |
| -1 | 12 | -0.2146 | 0.4428 |
| 0 | 12 | -0.4056 | 0.5940 |
| 1 | 12 | -0.4026 | 0.5445 |
| 2 | 12 | -0.5133 | 0.5152 |
| 3 | 10 | -0.4765 | 0.6007 |
| 4 | 10 | -0.4215 | 0.4362 |
| 5 | 8 | -0.2482 | 0.3669 |
| 6 | 8 | -0.3069 | 0.4675 |
| 7 | 6 | -0.3977 | 0.4948 |
| 8 | 6 | -0.4800 | 0.5524 |
| 9 | 6 | -0.5425 | 0.5748 |
| 10 | 6 | -0.5190 | 0.5766 |
| 11 | 6 | -0.2864 | 0.6907 |
| 12 | 6 | -0.2137 | 0.7721 |

FIGURE 28

CUMULATIVE ERROR FOR
MKTDN



A possible explanation of the behavior of the "bear" market splits may lie in the fact that of the 12 stocks reverse split during generally declining markets five were listed on the New York Stock Exchange (see analysis of Minor Hypothesis H-2d above) which may account for much of the relatively positive performance.

Hypothesis H-2f is rejected with caution. There appears to be an inverse relationship as between the state of the market and relative behavior of returns of reverse split securities. The rejection of this hypothesis leads one to some rather contrary conclusions concerning investor attitudes and the information content inherent in reverse splits.

If reverse split price performance is relatively better during periods of investor pessimism (declining markets), then the information inherent in reverse splits must be positive. But if the previous statement is true, then reverse splits which occur during periods of investor optimism must bear information which is essentially negative. These statements are seemingly quite contradictory, but such is not necessarily true. During periods of generally rising markets investors expect events which normally signal further optimism. Since firms tend to reverse split their shares only in the most extreme circumstances such action will not likely be viewed as an optimistic signal. During "bull" markets investors face great numbers of favorable investment opportunities, and therefore would avoid those securities which have signaled that the firm is in extreme circumstances. During periods of general market decline, however, the investors' choices of favorable investment opportunities are greatly restricted. A firm "in trouble" during such periods of pessimism may not be viewed with quite the disdain as would be the case otherwise.

The preceding, while quite circuitous, has a certain appeal to the author, and seems to explain the apparent inverse relationship rather well.

## Conclusion

To conclude, many of the analytical tests performed upon different classifications and categories of reverse split securities in this study have proved somewhat inconclusive. However, we have been able to observe certain tendencies even though these tendencies are often strongly mitigated by exceptionally high values of standard deviations.

For ease of reference, each of the various hypotheses are listed (by name only) in the following table along with whether the hypothesis has been accepted or rejected.

TABLE 21

Summary Restatement of Results of Analysis

| | |
|---|---|
| Major Hypothesis H-1 | Rejected |
| Minor Hypothesis H-1a | Accepted |
| Minor Hypothesis H-1b | Accepted |
| Minor Hypothesis H-1c | Rejected |
| Minor Hypothesis H-1d | Rejected |
| Major Hypothesis H-2 | Tested Below |
| Minor Hypothesis H-2a | Accepted |
| Minor Hypothesis H-2b | Accepted |
| Minor Hypothesis H-2c | Rejected |
| Minor Hypothesis H-2d | Rejected |
| Minor Hypothesis H-2e | Rejected |
| Minor Hypothesis H-2f | Rejected |

## Notes

[1] Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, LX (February, 1974), A-35.

[2] Fama, *et al*, p. 9

[3] The FFJR study examined New York Stock Exchange listed shares only.

[4] Fama *et al*, p. 11.

[5] *Ibid*, p. 11.

[6] *Ibid*, p. 9.

[7] *Ibid*, p. 11.

[8] *Ibid*, p. 11.

[9] Barker (1957).

[10] Fama *et al*.

[11] Barker (1957). See Chapter I above.

# CHAPTER IV
# SUMMARY AND CONCLUSIONS

## Introduction

In this chapter we shall attempt to arrive at some firm conclusions based upon the results of the analysis as presented in the previous chapter. Each hypothesis along with the results of its analysis will be restated briefly. The implications of these results form the basis of our conclusions.

## Major Hypothesis H-1

There is no evidence of unusual behavior of return of reverse split stocks in the months around the effective date of the reverse split.

This hypothesis has been rejected due to a marked erosion of the average cumulative residual ($U_t$). The point of maximum price erosion (as indicated by $U_t$) occurs at month t= +9. $U_t$ at this month has a value of -0.4709.

The rejection of H-1 suggests that there may be information content inherent in a reverse split. From the behavior of the returns it is evident that if there is inherent information content it could well be negative. A second implication of the rejection of this hypothesis is that management tends to reverse split the firm's securities during periods of abnormal price behavior.

Minor Hypothesis H-1a

To the extent unusual price behavior exists, it begins considerably in advance of the effective date.

This hypothesis has been accepted. Table 5 and Figure 12 of the previous chapter indicate that unusual price behavior (as reflected by return behavior) begins virtually upon commencement of the 25-month test period. By month $t = 0$, the average cumulative residual has reached a value of -0.3233 indicating a serious erosion of prices of the reverse split securities.

Acceptance of this hypothesis implies that the reverse split is not the cause of the price erosion --- certainly not in the pre-split months.

Minor Hypothesis H-1b

Unusual price behavior persists after the effective date of the reverse split.

This hypothesis has been accepted. Table 5 of the previous chapter and Figure 12 clearly indicate that the negative tendencies of $U_t$ have not abated until the more distant post-split months. It is not until month $t = +10$ that $U_t$ reverses its consistent downward trend.

Given that we have rejected H-1 (which suggested that there might be information content in a reverse split and that such information may be of a negative nature) the acceptance of this hypothesis tends to reinforce and amplify the conclusions concerning H-1. The implication once again is that there is possible information inherent in a reverse split, and such information is negative insofar as the investment community is concerned.

### Minor Hypothesis H-1c

Abnormal profits are not available by following a policy of consistently selling (or buying) reverse split shares at the time of the split and holding for one year.

This hypothesis has been rejected. Attention is again directed to Figure 13 of the previous chapter. We find here that such negative information as may be inherent in reverse splits is not instantaneously evaluated by the market and captured in price. It is likely that --- given the class of securities examined here --- an instance of capital market inefficiency has been found, and that a profitable trading rule has been developed.

### Minor Hypothesis H-1d

Price behavior of reverse split stocks is the mirror image of the behavior of "normal" stock splits.

This hypothesis has been rejected. In the pre-split months the return behavior appears to be the mirror image of that of "normal" stock splits, but the persistence of negative returns far beyond the effective date of the reverse split makes it quite evident that we are dealing with a class of securities which is at radical variance with those studied by others.

The rejection of this hypothesis will not allow us to subscribe to the same conclusions as reached by FFJR in their study of "normal" stock splits (see Chapter I). The implication here is that there are significant differences between the two studies, and the next group of hypotheses explores possible areas wherein differences may exist.

## Major Hypothesis H-2

To the extent that unusual return behavior exists around the effective date of a reverse split, this behavior can be attributed to fundamental economic factors other than the reverse split.

This hypothesis has been tested indirectly through the six minor hypotheses which follow.

### Minor Hypothesis H-2a

Price behavior both pre- and post-split is not affected by the fact that a company is, or is not, presently paying a dividend.

This hypothesis has been accepted. We observed that there are apparent differences in the return behavior of dividend payers vis a vis non-dividend payers in that the behavior of returns as measured by $U_t$ is relatively positive for non-dividend payers. This apparent difference is mitigated by the high values of the standard deviations. It was further observed that only two non-paying stocks initiated dividend payments during the year immediately following the effective date of the reverse split.

The implications here are most confusing. Inasmuch as we have suggested that reverse splits may have negative information inherent in them (see H-1 and H-1b above), the results here might lead one to conclude that such information is more negative for dividend paying stocks than for non-dividend paying stocks. Further, since it was found that the non-dividend paying category performed relatively better, one could conclude that the reverse split was a positive dividend signal to the market. Such is not the case however.

### Minor Hypothesis H-2b

Price behavior around the split date is independent as to whether post-split dividend payments are higher, lower, or the same as pre-split payments.

This hypothesis has been accepted. Even though differences in the relative performance of the two categories of securities (dividends increased, and dividends unchanged) were observed during the pre-split months, these differences tend to disappear during the post-split months. In light of the high values of the standard deviations it may be fairly said that no differences exist at all.

The implications of the acceptance of this hypothesis are contradictory at best. Either the market views all reverse split securities in the same light regardless of post-split dividend policies, or the information content inherent in a reverse split is completely neutral insofar as dividends are concerned.

In Chapter II it was observed that the results of testing this hypothesis would be most difficult to interpret given the manner in which investors are assumed to price shares and bid prices upward or downward in response to changes in the dividend policies of the firms involved. The results of testing this hypothesis were indeed confusing, and any implications drawn from the results are inconclusive.

### Minor Hypothesis H-2c

Post-split price behavior is independent of the post-split price range of the security.

This hypothesis has been rejected. For purposes of testing this hypothesis stocks were divided into three categories: a) price at t= 0 less than \$5.00; b) price at t= 0 greater than \$5.00 but less than

\$15.00; and c) price at t= 0 greater than \$15.00. Of the three categories of stocks, the "greater than \$15.00" group was observed to demonstrate a relatively positive performance of $U_t$ vis a vis the other categories. Not only was the price performance relatively positive, but the values of the standard deviations were found to be significantly lower.

The implication of the findings here is that there appears to be a preferred trading range of prices for investors, and that those reverse split stocks in the higher price ranges tend to be more marketable. The relatively increased marketability, in turn, implies a wider market of prospective investors for those reverse split securities which are to be found in the higher price ranges. Essentially the difference in marketability can be attributed to investor acceptance.

### Minor Hypothesis H-2d

Post-split price behavior is independent of the exchange upon which a security is listed.

This hypothesis has been rejected. Very significant differences in the performances (both relative and absolute) were found as between stocks listed on the two major exchanges. The performance of the average cumulative residuals of American Stock Exchange listed stocks was found to be very much in line with the results of all reverse split securities taken as a whole. The New York Stock Exchange listed securities, however, displayed totally unique values for $U_t$ for the later post-split months. It was found that $U_t$ for months t= +9 through t= +12 was positive and trending upward. This characteristic of behavior of returns was not observed for any other cross section of securities in the study.

The implications here concern marketability once again. Evidence has been found to support the long-held belief that, other things being equal, investors prefer New York Stock Exchange listed securities. Caution must be exercised, however, in the assignment of any causal relationship inasmuch as post-split prices for this category of reverse split stocks was found to be generally higher, and the total market value of the common equity was also found to be significantly higher than for American Stock Exchange listed securities.

## Minor Hypothesis H-2e

Post-split price behavior is independent of the reverse split ratio.

This hypothesis has been rejected. Some differences were observed in the relative performances of the average cumulative residuals for the stocks which were reverse split with a ratio of 1:10 or greater. This category of securities showed a relatively negative performance vis a vis other reverse split securities.

It was observed, however, that the relatively poor showing of the 1:10 or greater group could well be due to price range rather than to split ratio alone. It was further noted that the size of the standard deviations proved to be exceptionally high for this category of stocks.

Any implications to be drawn from the results of the analysis here are mitigated by the fact that the higher split ratios tend to be associated with lower post-split price ranges (see H-2c above), and with very high standard deviations.

## Minor Hypothesis H-2f

Post split price behavior is independent of the time period in which the reverse split occurred.

This hypothesis has been rejected. An apparent inverse relationship was discovered here. It was found that: 1) more reverse splits occurred during "bull" markets than in "bear" markets; but 2) the performance of reverse split stocks was relatively positive for those which occurred during "bear" markets. Since there was a much greater period of time which could be called "bull" market during the period studied, one would expect that there might well be more reverse splits during these periods. Such does not, however, explain the relative differences in performances.

The implication of the results of testing this hypothesis is that a reverse split is viewed by the market more negatively during "bull" markets than otherwise. This leads to a consideration of the relative impact of similar information received at differing times. Though this latter point is well beyond the scope of this study, the idea is advanced that general investor optimism or pessimism may play a large role here.

## Conclusions

The conclusions of this study revolve around three areas: information inherent in reverse splits, marketability, and possible capital market inefficiency. Many of the conclusions which the author would like to subscribe to are mitigated against by high values of standard deviations of the various test results. As stated repeatedly in the analysis section of Chapter III, these high value standard deviations cloud the results and their meanings.

Insofar as possible information content inherent in reverse splits is concerned, we do not have conclusive evidence. If information is contained in reverse splits, however, it would appear to be negative in most cases.

If evidence of negative information inherent in reverse splits may be said to exist, such is found in the results of testing minor hypothesis H-1b.

Results of the analysis as it pertains to dividend paying versus non-dividend paying securities must be classified as being inconclusive at best. Differences in relative performance of the average cumulative residuals appear during the pre-split periods (see H-2a and H-2b), but either the differences tend to disappear during the post-split period of the analysis; the differences are clouded by exceptionally high values of the standard deviations; or the results appear to be contradictory. This latter point is especially the case in the analysis of H-2b.

Significant differences as to the marketability of different categories of reverse split stocks appear to have been found. These findings lead one to conclude that higher priced securities enjoy a wider market. The differences here must be qualified again by high values of standard deviations. Nonetheless, one may state that the tendency toward greater market acceptance (marketability) exists.

Perhaps the (statistically) most significant finding of the study was that of the relative performance of New York Stock Exchange listed shares. A totally unique pattern of behavior of the average cumulative residuals was discovered for this class of securities. Further analysis revealed that these New York Stock Exchange listed stocks also tended to be in the higher post-split price categories, which leads one to logically connect the two characteristics. Since the securities listed on the New York Stock Exchange tend to be those of the larger and financially more powerful firms, these characteristics come as no surprise. The results of the analysis of these characteristics and the conclusions which flow from the analysis also come as no surprise.

To the author the most interesting conclusions involve possible capital market inefficiency (H-1c). The analysis has revealed that the possible negative information inherent in the reverse split (as determined by H-1 and H-1b) is _not_ instantaneously discounted by the market through the price mechanism. The existence of possible profitable trading rules should be a finding of great interest to market speculators who are able to accept the risk of short selling.

The existence of possible market inefficiency is of importance in that we may have found an exception to the Efficient Market Hypothesis (as discussed in Chapter II). It would appear that abnormal profits _are_ available to the trader. It appears as if all information is _not_ instantly evaluated by the market.

In sum the conclusions reached by this semi-strong form test of the Efficient Market Hypothesis appear to be at some variance with conclusions reached by other researchers. We must state again, however, that this sample of securities (reverse split common stocks) has not --- to the author's knowledge --- been investigated in depth previously. It is the author's contention that the sample is so unique that perhaps "the rules" simply do not apply. In any case, the area deserves much further investigation by others to correct any shortcomings of this study.

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# APPENDIX A

# MISCELLANEOUS COMPANY DATA

## Table A-1

## Alphabetical Listing of Sample Stocks

| Company Name | Company[a] Number |
|---|---|
| Acme-Hamilton Manufacturing Company | 06 |
| Atlas Consolidated Mining and Industrial | 44 |
| Bunker-Ramo | 22 |
| C. L. Financial | 03 |
| Cabol Enterprises | 21 |
| Cadence Industries | 13 |
| Canadian Merrill | 29 |
| Charan Industries | 16 |
| Colt Industries | 15 |
| Community Discount Centers | 18 |
| Consolidated Canadian Faraday | 08 |
| E-Systems, Inc. | 01 |
| Elgin National Industries, Inc. | 35 |
| ElTronics (60)[b] | 23 |
| ElTronics (68) | 24 |
| 1st S & L Shares | 38 |

Table A-1 - continued

| Company Name | Company Number |
|---|---|
| Great Basin Petroleum | 20 |
| Highway Trailer Industries | 02 |
| Hycon Manufacturing | 04 |
| I T I Corporation | 05 |
| Kingsford Company | 45 |
| Kirby Industries | 42 |
| Madison Square Garden | 31 |
| Marinduque Mining, Manufacturing, & Industrial | 41 |
| McCullouch Oil | 32 |
| Molybdenite Corporation of Canada, Ltd. | 07 |
| Monogram Industries | 36 |
| National Union Electric | 14 |
| Nucor | 10 |
| Peel-Elder | 26 |
| Pleesy, Ltd. (ADR) | 39 |
| Prudential Funds | 40 |
| Roosevelt Raceway | 11 |

Table A-1 - continued

| Company Name | Company Number |
|---|---|
| Royal American Industries, Inc. | 19 |
| Studebaker-Worthington | 17 |
| Stylon | 12 |
| Supercrete, Ltd. | 30 |
| Surveyor Fund | 37 |
| Texstar | 27 |
| U. S. Filter | 34 |
| Waltham Precision Industries | 25 |
| Wheelabrator-Frye International Corporation | 43 |
| White Eagle International | 09 |
| Yonkers Raceway | 28 |

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a) Company numbers were arbitrarily assigned in the order in which data was processed.

b) ElTronics, Inc. reverse split twice during the sample period. Data for the two splits have been divided at the midpoint between the two split dates.

## Table A-2

Numerical Listing of Sample Stocks with
Split Ratio, Split Year, and Exchange of Record

| Company Number | Company Name | Split Ratio | Split Year | Exchange[a] |
|---|---|---|---|---|
| 01 | E-Systems, Inc. | 2:5 | 1973 | ASE |
| 02 | Highway Trailer Industries | 1:5 | 1962 | ASE |
| 03 | C. L. Financial | 1:5 | 1972 | ASE |
| 04 | Hycon Manufacturing | 1:5 | 1964 | ASE |
| 05 | I T I Corporation | 1:15 | 1964 | ASE |
| 06 | Acme-Hamilton Manufacturing Company | 1:5 | 1965 | ASE |
| 07 | Molybdenite Corporation of Canada, Ltd. | 1:5 | 1969 | ASE |
| 08 | Consolidated Canadian Faraday | 2:5 | 1963 | ASE |
| 09 | White Eagle International | 1:10 | 1964 | ASE |
| 10 | Nucor | 1:4 | 1972 | ASE |
| 11 | Roosevelt Raceway | 1:4 | 1963 | ASE |
| 12 | Stylon | 1:4 | 1962 | ASE |
| 13 | Cadence Industries | 1:4 | 1966 | NYSE |
| 14 | National Union Electric | 1:5 | 1964 | ASE |
| 15 | Colt Industries | 1:3 | 1964 | NYSE |

Table A-2 - continued

| Company Number | Company Name | Split Ratio | Split Year | Exchange |
|---|---|---|---|---|
| 16 | Charan Industries | 1:4 | 1964 | ASE |
| 17 | Studebaker-Worthington | 1:5 | 1965 | NYSE |
| 18 | Community Discount Centers | 1:5 | 1965 | ASE |
| 19 | Royal American Industries, Inc. | 1:10 | 1971 | ASE |
| 20 | Great Basin Petroleum | 1:2 | 1968 | ASE |
| 21 | Cabol Enterprises | 1:10 | 1962 | ASE |
| 22 | Bunker-Ramo | 1:3 | 1973 | NYSE |
| 23 | ElTronics (60) | 1:5 | 1960 | ASE |
| 24 | ElTronics (68) | 1:3 | 1968 | ASE |
| 25 | Waltham Precision Industries | 1:16 | 1966 | ASE |
| 26 | Peel-Elder | 1:10 | 1963 | ASE |
| 27 | Texstar | 1:10 | 1964 | ASE |
| 28 | Yonkers Raceway | 1:4 | 1968 | ASE |
| 29 | Canadian Merrill | 1:5 | 1971 | ASE |
| 30 | Supercrete, Ltd. | 1:3 | 1966 | ASE |
| 31 | Madison Square Garden | 1:5 | 1973 | NYSE |
| 32 | McCullouch Oil | 1:5 | 1963 | ASE |

Table A-2 - continued

| Company Number | Company Name | Split Ratio | Split Year | Exchange |
|---|---|---|---|---|
| 34[b] | U. S. Filter | 1:10 | 1966 | ASE |
| 35 | Elgin National Industries, Inc. | 1:3 | 1973 | NYSE |
| 36 | Monogram Industries | 1:4 | 1965 | ASE |
| 37 | Surveyor Fund | 1:4 | 1972 | NYSE |
| 38 | 1st S & L Shares | 1:5 | 1969 | ASE |
| 39 | Plessy, Ltd. (ADR) | 1:10 | 1973 | NYSE |
| 40 | Prudential Funds | 3:10 | 1973 | ASE |
| 41 | Marinduque Mining, Manufacturing, & Industrial | 1:4 | 1971 | ASE |
| 42 | Kirby Industries | 1:5 | 1961 | ASE |
| 43 | Wheelabrator-Frye International Corporation | 1:3 | 1972 | ASE |
| 44 | Atlas Consolidated Mining and Industrial | 1:10 | 1964 | ASE |
| 45 | Kingsford Company | 1:5 | 1965 | ASE |

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a) American Stock Exchange = ASE; New York Stock Exchange = NYSE.

b) Upon analysis data for company number 33 (Meridian Industries) have been determined to be incomplete and was therefore eliminated.

## TABLE A-3

## Price and Capitalization Statistics

| Co. No. | Price t= -1 | Price t= 0 | Debt/ Equity[a] | Outstanding Shares (000's)[b] | Total Equity[c] (000's) |
|---|---|---|---|---|---|
| 01 | $4.125 | $ 9.75 | 1.4 | 4,978 | $20,534 |
| 02 | 1.75 | 9.50 | 1.1 | 3,570 | 6,248 |
| 03 | 2.625 | 10.625 | 2.1 | 4,860 | 12,758 |
| 04 | 2.50 | 9.125 | Def. | 8,250 | 20,625 |
| 05 | 0.25 | 2.875 | 0.9 | 13,545 | 3,386 |
| 06 | 0.9375 | 3.50 | 2.7 | 3,650 | 3,242 |
| 07 | 2.3125 | 11.375 | 0.3 | 2,980 | 6,891 |
| 08 | 1.00 | 3.0625 | 0.3 | 4,405 | 4,405 |
| 09 | 0.375 | 3.00 | 5.7 | 6,968 | 2,613 |
| 10 | 3.625 | 15.00 | 1.1 | 7,976 | 28,913 |
| 11 | 4.25 | 15.50 | 0.6 | 7,032 | 29,886 |
| 12 | 2.00 | 7.25 | 0.8 | 2,256 | 4,512 |
| 13 | 3.625 | 11.875 | 1.0 | 5,396 | 19,561 |
| 14 | 2.375 | 12.25 | 0.4 | 5,510 | 13,086 |
| 15 | 5.375 | 13.625 | 1.2 | 8,187 | 44,005 |
| 16 | 0.6875 | 2.375 | 2.3 | 1,832 | 1,260 |

TABLE A-3 Continued

| Co. No. | Price t= -1 | Price t= 0 | Debt/ Equity[a] | Outstanding Shares (000's)[b] | Total Equity[c] (000's) |
|---|---|---|---|---|---|
| 17 | $5.75 | $23.00 | 2.0 | 13,915 | $ 80,011 |
| 18 | 1.375 | 4.50 | 6.1 | 4,040 | 5,555 |
| 19 | 2.125 | 15.125 | 0.8 | 22,418 | 47,638 |
| 20 | 5.625 | 9.75 | 0.1 | 6,916 | 38,903 |
| 21 | 0.375 | 3.1875 | 4.3 | 17,111 | 6,417 |
| 22 | 6.50 | 14.125 | 0.6 | 55,656 | 361,764 |
| 23 | 1.125 | 7.75 | 2.0 | 9,320 | 10,485 |
| 24 | 6.625 | 16.125 | 3.6 | 2,940 | 19,478 |
| 25 | 0.375 | 2.875 | 0.4 | 19,312 | 7,242 |
| 26 | 0.8125 | 10.50 | 1.7 | 4,710 | 3,827 |
| 27 | 0.625 | 5.50 | 1.0 | 9,169 | 5,731 |
| 28 | 4.875 | 20.125 | 0.9 | 4,116 | 20.066 |
| 29 | 1.375 | 4.50 | 0.02 | 5,420 | 7,453 |
| 30 | 2.875 | 6.625 | 0.8 | 4,948 | 14,226 |
| 31 | 2.125 | 8.125 | 2.1 | 24,006 | 51,013 |
| 32 | 1.875 | 9.125 | 1.1 | 12,130 | 22,744 |
| 34 | 1.375 | 14.375 | 1.7 | 5,904 | 8,118 |

## TABLE A-3 Continued

| Co. No. | Price t= -1 | Price t= 0 | Debt/ Equity[a] | Outstanding Shares (000's)[b] | Total Equity[c] (000's) |
|---|---|---|---|---|---|
| 35 | $4.375 | $ 7.375 | 1.4 | 10,203 | $ 44,638 |
| 36 | 1.625 | 6.75 | 0.5 | 3,709 | 6,027 |
| 37 | 6.125 | 25.75 | 0.3 | 20,988 | 128,552 |
| 38 | 6.375 | 18.75 | 12.8 | 5,035 | 32,098 |
| 39 | 2.75 | 25.375 | 0.7 | 84,240 | 231,660 |
| 40 | 1.50 | 2.25 | 0.9 | 2,920 | 4,380 |
| 41 | 5,875 | 19.375 | 0.5 | 9,776 | 57,434 |
| 42 | 0.875 | 4.8125 | 0.6 | 3,070 | 2,686 |
| 43 | 9.625 | 27.375 | 0.8 | 23,931 | 230,336 |
| 44 | 1.40 | 12.25 | 0.6 | 23,583 | 33,016 |
| 45 | 1.875 | 8.75 | 0.2 | 2,700 | 5,063 |
| Average | 2.864 | 10.791 | 1.638 | 11,445 | 38,829 |
| $\sigma$ | 2.209 | 6.718 | 2.203 | 14,763 | 70,770 |

---

a) Debt/Equity is the ratio of total outstanding debt to total equity. All figures are as of the end of the fiscal period just prior to the date of the reverse split.

b) Total common shares outstanding as of the end of the fiscal period just prior to the date of the reverse split.

c) Total common shares outstanding as of the end of the fiscal period just prior to the date of the reverse split multiplied by the price at month t= -1.

# APPENDIX B

## REGRESSION STATISTICS FOR INDIVIDUAL COMPANIES

The following is offered as a guide to reading the tables in this Appendix.

J First: First month for which return data is available.

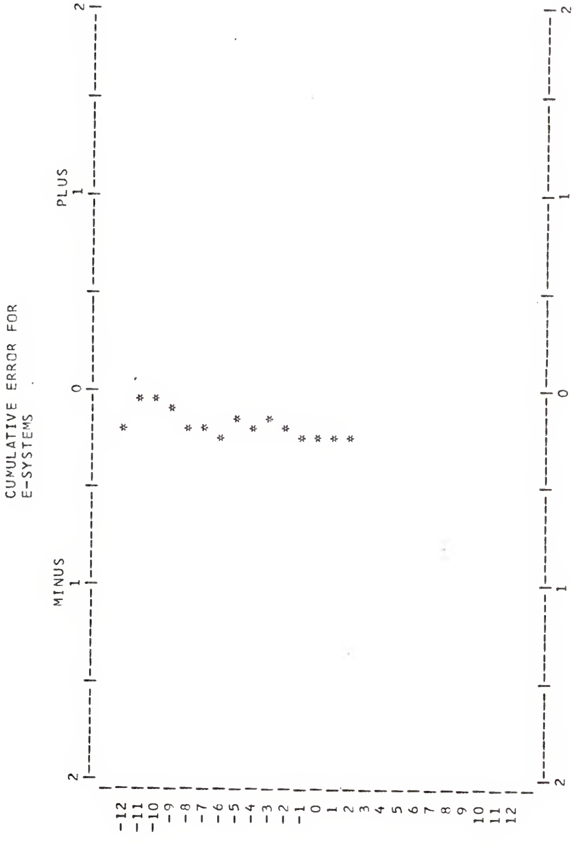
J Split: Month of reverse split.

J Last: Last month for which return data is available.

99.99998: Data unavailable.

Data for all companies in the sample is presented in numeric order.

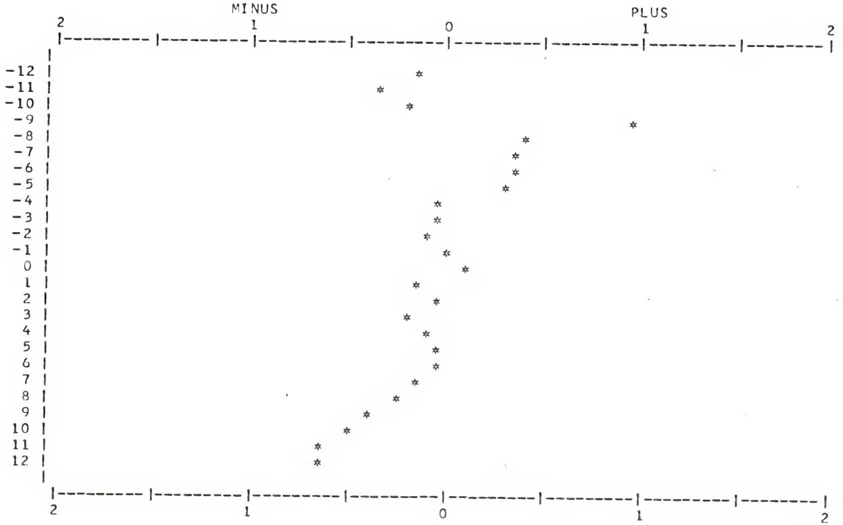
```
DATA FOR STOCK NO.  1      E-SYSTEMS

                    JSPLIT EQUALS    159
                    JFIRST EQUALS     64
                    JLAST  EQUALS    161


      REGRESSION STATISTICS BASED ON    83  OBSERVATIONS
    A             B          CORR      SEY          SEA          SEB

-3.51E-01   1.36E 00   0.311    1.65E-01    4.65E-01    4.62E-01


      DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
     MONTH   OBSERVATION   PREDICTION        ERROR    CUM ERROR

      -12      0.86486       1.01795      -0.15308    -0.15308
      -11      1.21875       1.03429       0.18446     0.03137
      -10      0.93846       0.98644      -0.04798    -0.01660
       -9      0.97222       1.02166      -0.04944    -0.06605
       -8      0.97143       1.05774      -0.08631    -0.15236
       -7      0.95882       0.99964      -0.04081    -0.19317
       -6      1.00000       1.00888      -0.00888    -0.20205
       -5      1.15625       1.07794       0.07831    -0.12374
       -4      0.98919       1.03417      -0.04498    -0.16872
       -3      1.05556       1.00739       0.04817    -0.12055
       -2      0.89474       0.95926      -0.06452    -0.18507
       -1      0.98941       1.01717      -0.02776    -0.21284

        0      0.94545       0.95137      -0.00592    -0.21875
        1      0.97436       0.99026      -0.01590    -0.23465
        2      1.02105       1.00847       0.01258    -0.22207
        3     99.99998      99.99998      99.99998    99.99998
        4     99.99998      99.99998      99.99998    99.99998
        5     99.99998      99.99998      99.99998    99.99998
        6     99.99998      99.99998      99.99998    99.99998
        7     99.99998      99.99998      99.99998    99.99998
        8     99.99998      99.99998      99.99998    99.99998
        9     99.99998      99.99998      99.99998    99.99998
       10     99.99998      99.99998      99.99998    99.99998
       11     99.99998      99.99998      99.99998    99.99998
       12     99.99998      99.99998      99.99998    99.99998


                    ANALYSIS OF ERROR TERMS

                                   MEAN       STD DEV

            BEFORE SPLIT        -0.01774      0.08688

            AFTER SPLIT         -0.00308      0.01445
```



CUMULATIVE ERROR FOR E-SYSTEMS

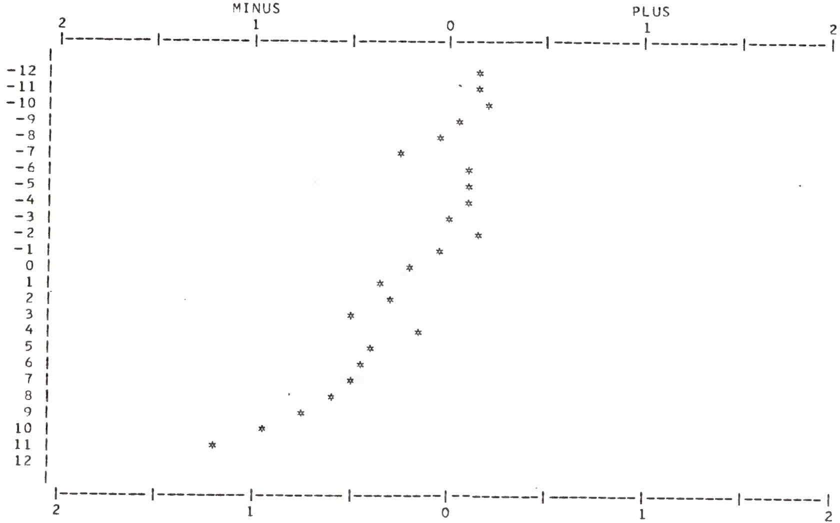
```
DATA FOR STOCK NO.  2     HIGHWAY TRAILER

                     JSPLIT EQUALS    32
                     JFIRST EQUALS     1
                     JLAST  EQUALS    72


     REGRESSION STATISTICS BASED ON    47  OBSERVATIONS
   A            B        CORR      SEY         SEA        SEB

8.90E-01   1.24E-01  0.014   2.28E-01   1.36E 00   1.34E 00


    DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

    -12      0.88000        1.01348    -0.13348   -0.13348
    -11      0.81818        1.01831    -0.20013   -0.33361
    -10      1.16667        1.01902     0.14765   -0.18596
     -9      2.23809        1.01668     1.22141    1.03545
     -8      0.44681        1.01062    -0.56381    0.47164
     -7      0.95238        1.01672    -0.06434    0.40730
     -6      1.05000        1.01595     0.03405    0.44135
     -5      0.95238        1.00605    -0.05366    0.38768
     -4      0.65000        1.00556    -0.35556    0.03212
     -3      0.92308        1.00457    -0.08149   -0.04937
     -2      1.00000        1.02297    -0.02297   -0.07233
     -1      1.16667        1.01688     0.14979    0.07745

      0      1.08571        1.00879     0.07693    0.15438
      1      0.75000        1.01625    -0.26625   -0.11187
      2      1.12281        1.02815     0.09465   -0.01721
      3      0.87500        1.01653    -0.14153   -0.15875
      4      1.12500        1.02082     0.10418   -0.05457
      5      1.11111        1.01066     0.10046    0.04588
      6      1.00000        1.02023    -0.02023    0.02566
      7      0.87143        1.02179    -0.15036   -0.12470
      8      0.91803        1.01800    -0.09997   -0.22467
      9      0.83929        1.01108    -0.17180   -0.39647
     10      0.91489        1.01467    -0.09978   -0.49624
     11      0.90698        1.02148    -0.11450   -0.61074
     12      1.00000        1.01420    -0.01420   -0.62494


                    ANALYSIS OF ERROR TERMS

                                       MEAN        STD DEV

            BEFORE SPLIT            0.00645       0.43202

            AFTER SPLIT            -0.05403       0.12062
```

CUMULATIVE ERROR FOR
HIGHWAY TRAILER



```
DATA FOR STOCK NO.  3     C L FINANCIAL

                    JSPLIT EQUALS   150
                    JFIRST EQUALS    76
                    JLAST  EQUALS   161


        REGRESSION STATISTICS BASED ON   62  OBSERVATIONS
      A          B         CORR      SEY         SEA         SEB

 4.39E-01   5.75E-01  0.140   1.70E-01   5.27E-01   5.24E-01


         DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
        MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

         -12      1.21053      0.98814      0.22239    0.22239
         -11      1.04348      1.04711     -0.00363    0.21876
         -10      1.08333      1.01182      0.07151    0.29027
          -9      0.80769      0.98951     -0.18181    0.10846
          -8      0.90476      1.01723     -0.11247   -0.00402
          -7      0.84211      1.06169     -0.21958   -0.22360
          -6      1.43750      1.03119      0.40631    0.18272
          -5      1.00000      1.02869     -0.02869    0.15403
          -4      1.04348      1.02466      0.01882    0.17285
          -3      0.91667      1.01779     -0.10112    0.07173
          -2      1.18182      1.02471      0.15711    0.22884
          -1      0.80769      1.00446     -0.19677    0.03207

           0      0.80952      1.01936     -0.20984   -0.17777
           1      0.87059      1.03463     -0.16404   -0.34181
           2      1.05405      1.01004      0.04401   -0.29780
           3      0.85897      1.01395     -0.15498   -0.45278
           4      1.35821      1.04318      0.31503   -0.13775
           5      0.79121      1.02465     -0.23345   -0.37119
           6      0.97222      1.01332     -0.04110   -0.41229
           7      0.91429      0.99296     -0.07867   -0.49096
           8      0.93750      1.01746     -0.07996   -0.57093
           9      0.83333      0.98962     -0.15629   -0.72721
          10      0.82000      1.00607     -0.18607   -0.91328
          11      0.75610      1.01378     -0.25768   -1.17097
          12     99.99998     99.99998     99.99998   99.99998


                    ANALYSIS OF ERROR TERMS

                                     MEAN       STD DEV

              BEFORE SPLIT          0.00267     0.18789

              AFTER SPLIT          -0.10025     0.15660
```

CUMULATIVE ERROR FOR
C L FINANCIAL



```
DATA FOR STOCK NO.  4     HYCON MANUFACTURING

                        JSPLIT EQUALS    51
                        JFIRST EQUALS     9
                        JLAST  EQUALS   136


     REGRESSION STATISTICS BASED ON  103  OBSERVATIONS
   A            B          CORR       SEY        SEA          SEB

-1.70E-01   1.17E 00  0.326    1.37E-01   3.39E-01   3.37E-01


      DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
     MONTH  OBSERVATION  PREDICTION       ERROR    CUM ERROR

      -12      1.23809        1.06279       0.17530      0.17530
      -11      1.11538        1.02734       0.08804      0.26334
      -10      0.96552        0.96246       0.00306      0.26641
       -9      0.89286        0.99609      -0.10324      0.16317
       -8      0.96000        1.05990      -0.09990      0.06327
       -7      0.95833        0.99170      -0.03337      0.02990
       -6      1.00000        1.05220      -0.05220     -0.02230
       -5      0.95652        0.97328      -0.01676     -0.03905
       -4      0.86364        1.03096      -0.16732     -0.20637
       -3      1.00000        1.02919      -0.02919     -0.23556
       -2      0.89474        1.02351      -0.12877     -0.36433
       -1      1.17647        1.01925       0.15722     -0.20712

        0      0.73000        1.00238      -0.27238     -0.47950
        1      1.04110        1.01830       0.02279     -0.45670
        2      0.90789        1.00884      -0.10094     -0.55765
        3      0.84058        1.02394      -0.18336     -0.74101
        4      0.98276        0.98467      -0.00191     -0.74292
        5      0.91228        1.03636      -0.12408     -0.86700
        6      1.17308        1.00037       0.17270     -0.69429
        7      1.01639        0.99900       0.01739     -0.67691
        8      0.87097        1.00496      -0.13399     -0.81090
        9      1.16667        1.04284       0.12383     -0.68707
       10      0.90476        0.98941      -0.08465     -0.77172
       11      1.03509        0.98513       0.04996     -0.72176
       12      0.98305        1.04926      -0.06621     -0.78797


                  ANALYSIS OF ERROR TERMS

                                    MEAN       STD DEV

            BEFORE SPLIT         -0.01726      0.10864

            AFTER SPLIT          -0.04468      0.12431
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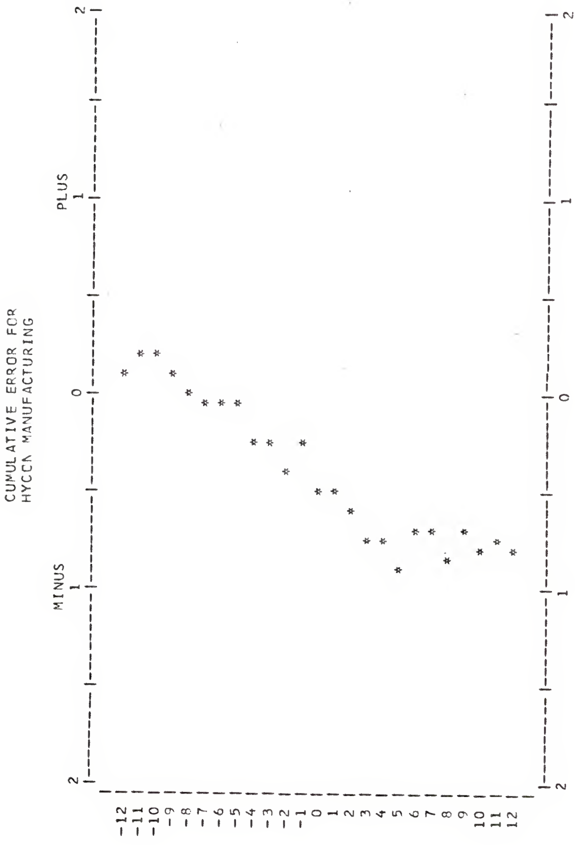

CUMULATIVE ERROR FOR
HYCON MANUFACTURING
MINUS
PLUS
2
1
0
1
2
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
11
12

```
DATA FOR STOCK NO.  5      I T I CORPORATION

                     JSPLIT EQUALS    51
                     JFIRST EQUALS     1
                     JLAST  EQUALS   164


   REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
  A           B         CORR      SEY         SEA        SEB

-4.06E-01  1.40E 00  0.264   1.95E-01   4.40E-01   4.37E-01


   DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
  MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

   -12      1.00000       1.07369    -0.07369   -0.07369
   -11      1.00000       1.03115    -0.03115   -0.10485
   -10      0.80000       0.95327    -0.15327   -0.25812
    -9      1.00000       0.99365     0.00635   -0.25177
    -8      1.50000       1.07022     0.42978    0.17801
    -7      0.83333       0.98837    -0.15504    0.02297
    -6      0.80000       1.06099    -0.26099   -0.23801
    -5      1.00000       0.96626     0.03374   -0.20428
    -4      1.25000       1.03549     0.21451    0.01024
    -3      0.80000       1.03337    -0.23337   -0.22313
    -2      0.75000       1.02655    -0.27655   -0.49968
    -1      1.33333       1.02144     0.31189   -0.18779

     0      0.76667       1.00119    -0.23452   -0.42231
     1      1.00000       1.02030    -0.02030   -0.44261
     2      0.86957       1.00894    -0.13938   -0.58199
     3      0.85000       1.02707    -0.17707   -0.75906
     4      0.94118       0.97993    -0.03876   -0.79781
     5      1.18750       1.04197     0.14553   -0.65229
     6      0.84211       0.99878    -0.15668   -0.80896
     7      1.00000       0.99714     0.00286   -0.80610
     8      1.00000       1.00428    -0.00428   -0.81039
     9      1.06250       1.04975     0.01275   -0.79763
    10      0.94118       0.98563    -0.04445   -0.84209
    11      0.93750       0.98049    -0.04299   -0.88507
    12      1.06667       1.05745     0.00921   -0.87586

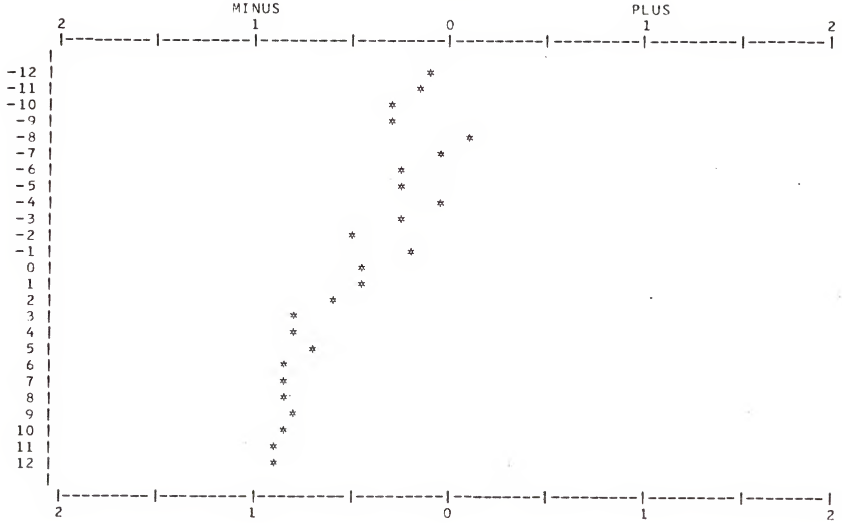

                  ANALYSIS OF ERROR TERMS

                                  MEAN       STD DEV

           BEFORE SPLIT        -0.01565     0.22947

           AFTER SPLIT         -0.05293     0.10046
```

CUMULATIVE ERROR FOR
I T I CORPORATION



```
DATA FOR STOCK NO.  6     ACME-HAMILTON MANUFACTURING

                    JSPLIT EQUALS    64
                    JFIRST EQUALS     1
                    JLAST  EQUALS   164


     REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
  A            B        CORR      SEY          SEA          SEB

-4.55E-01   1.45E 00  0.311   1.68E-01   3.80E-01   3.77E-01


    DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

    -12      0.77778       1.01877    -0.24099   -0.24099
    -11      1.00000       1.00704    -0.00704   -0.24803
    -10      1.00000       1.02576    -0.02576   -0.27379
     -9      0.92857       0.97706    -0.04849   -0.32228
     -8      0.84615       1.04117    -0.19501   -0.51729
     -7      1.00000       0.99653     0.00347   -0.51382
     -6      1.36364       0.99484     0.36880   -0.14503
     -5      0.86667       1.00222    -0.13555   -0.28058
     -4      1.69231       1.04920     0.64311    0.36253
     -3      0.90909       0.98294    -0.07385    0.28868
     -2      0.90000       0.97763    -0.07763    0.21105
     -1      0.88889       1.05716    -0.16827    0.04277

      0      0.93750       0.97102    -0.03352    0.00925
      1      0.74667       0.92822    -0.18155   -0.17230
      2      1.14286       1.01547     0.12739   -0.04491
      3      1.00000       1.02653    -0.02653   -0.07144
      4      0.78125       1.05291    -0.27166   -0.34310
      5      1.08000       1.04612     0.03388   -0.30922
      6      0.96296       0.97250    -0.00954   -0.31876
      7      0.96154       1.01244    -0.05090   -0.36966
      8      1.12000       0.99579     0.12421   -0.24545
      9      1.07143       0.96218     0.10925   -0.13621
     10      1.00000       0.96017     0.03983   -0.09638
     11      0.93333       1.00296    -0.06963   -0.16600

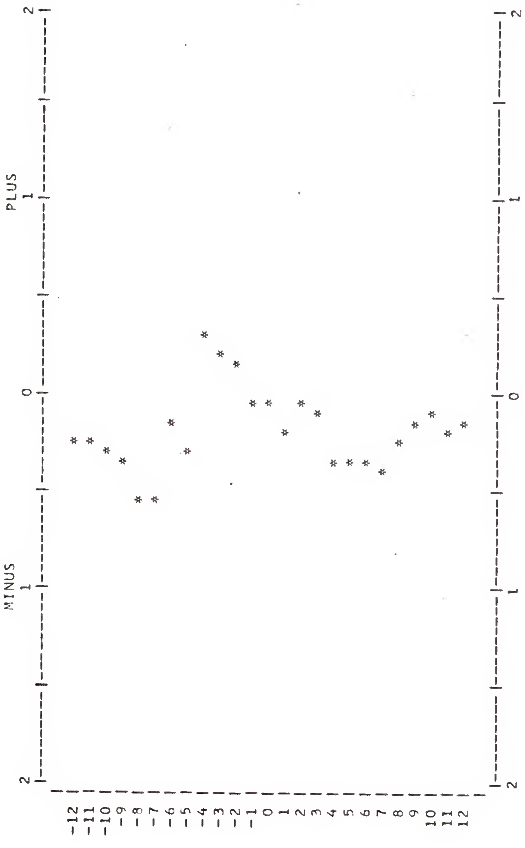

                 ANALYSIS OF ERROR TERMS

                                  MEAN       STD DEV

            BEFORE SPLIT        0.00356     0.25348

            AFTER SPLIT        -0.01315     0.11605
```

CUMULATIVE ERROR FOR
ACME-HAMILTON MANUFACTURING



```
DATA FOR STOCK NO.  7     MOLYBDENITE CORP OF CANADA

                    JSPLIT EQUALS    117
                    JFIRST EQUALS      1
                    JLAST  EQUALS    143


      REGRESSION STATISTICS BASED ON  118  OBSERVATIONS
  A           B         CORR      SEY          SEA          SEB

8.37E-01   1.79E-01  0.032   2.02E-01   5.26E-01   5.21E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION  PREDICTION      ERROR    CUM ERROR

     -12      0.81818       1.01760     -0.19942    -0.19942
     -11      0.88889       1.02479     -0.13590    -0.33532
     -10      2.31250       1.00870      1.30380     0.96849
      -9      1.54054       1.01380      0.52674     1.49522
      -8      0.77193       1.01071     -0.23878     1.25644
      -7      0.68182       1.02599     -0.34417     0.91227
      -6      0.90000       1.02048     -0.12048     0.79178
      -5      1.07407       1.01722      0.05685     0.84864
      -4      0.93103       1.00935     -0.07831     0.77033
      -3      1.00000       1.00617     -0.00617     0.76416
      -2      0.88889       1.02602     -0.13713     0.62703
      -1      0.77083       1.01260     -0.24177     0.38526

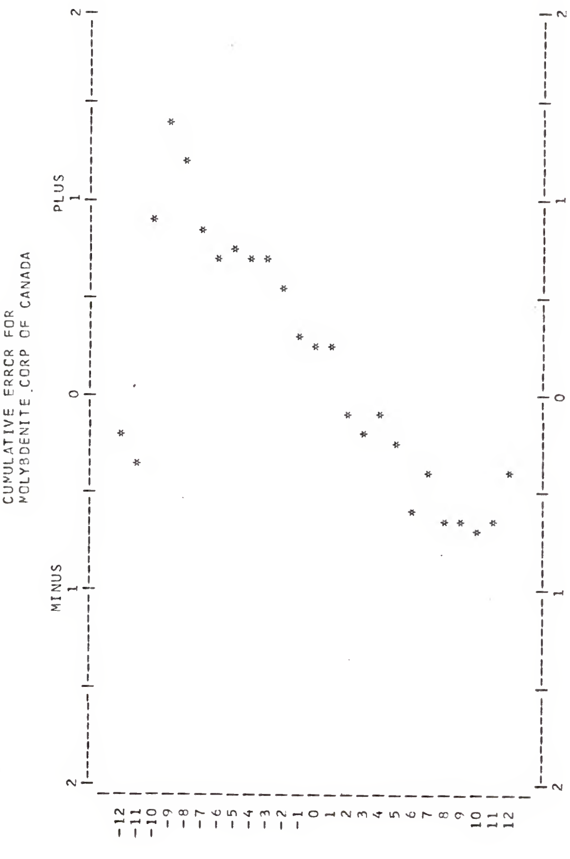
       0      0.98378       1.02397     -0.04019     0.34507
       1      0.97802       1.00999     -0.03197     0.31311
       2      0.61798       1.01600     -0.39803    -0.08492
       3      0.92727       1.00331     -0.07604    -0.16096
       4      1.09804       1.02621      0.07183    -0.08913
       5      0.87500       1.01590     -0.14090    -0.23002
       6      0.65306       1.00212     -0.34906    -0.57908
       7      1.18750       1.00677      0.18073    -0.39835
       8      0.78947       1.00918     -0.21971    -0.61806
       9      1.00000       1.02916     -0.02916    -0.64722
      10      1.00000       1.02570     -0.02570    -0.67292
      11      1.06667       1.02319      0.04348    -0.62944
      12      1.25000       1.01685      0.23315    -0.39629


                     ANALYSIS OF ERROR TERMS

                                    MEAN        STD DEV

             BEFORE SPLIT          0.03211      0.45725

             AFTER SPLIT          -0.06012      0.18380
```



CUMULATIVE ERRCR FOR
MOLYBDENITE CORP OF CANADA

```
DATA FOR STOCK NO.  8     CONSOLIDATED CANADIAN FARADAY

                     JSPLIT EQUALS    49
                     JFIRST EQUALS     1
                     JLAST  EQUALS   148


   REGRESSION STATISTICS BASED ON  123  OBSERVATIONS
  A           B         CORR       SEY          SEA          SEB

4.82E-01   5.58E-01  0.051   4.29E-01   1.00E 00   9.93E-01


  DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
 MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

  -12     1.00000        1.02118     -0.02118    -0.02118
  -11     1.00000        1.06409     -0.06409    -0.08527
  -10     1.10087        1.07107      0.02979    -0.05547
   -9     0.87999        1.05412     -0.17413    -0.22961
   -8     0.95456        1.02309     -0.06853    -0.29814
   -7     0.96760        1.03918     -0.07157    -0.36972
   -6     1.00000        1.06969     -0.06969    -0.43940
   -5     0.90000        1.03708     -0.13708    -0.57648
   -4     0.96224        1.06601     -0.10377    -0.68025
   -3     0.94116        1.02827     -0.08711    -0.76736
   -2     0.87500        1.05585     -0.18085    -0.94821
   -1     1.17143        1.05501      0.11642    -0.83179

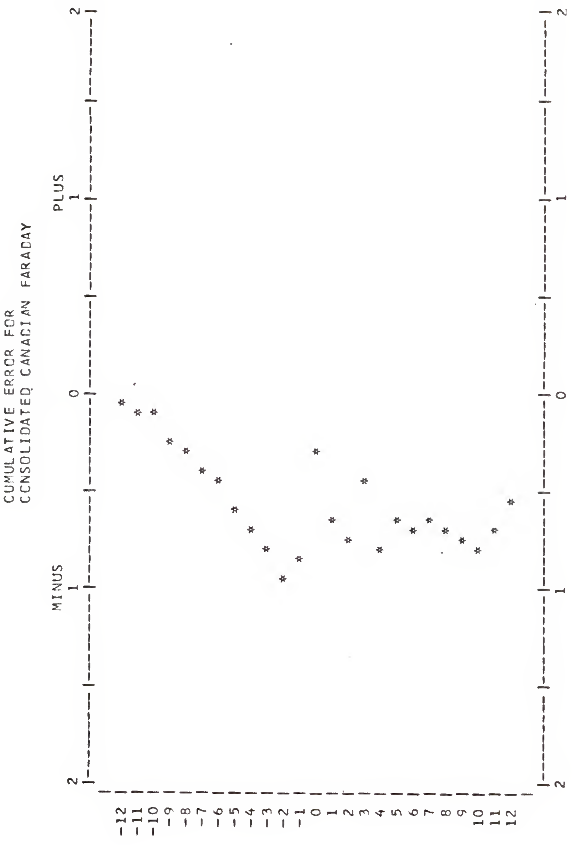
    0     1.62500        1.05229      0.57271    -0.25908
    1     0.67692        1.05025     -0.37333    -0.63241
    2     0.93182        1.04218     -0.11037    -0.74277
    3     1.35000        1.04980      0.30020    -0.44257
    4     0.70370        1.04527     -0.34157    -0.78414
    5     1.21053        1.05250      0.15803    -0.62611
    6     0.97778        1.03372     -0.05594    -0.68205
    7     1.09091        1.05843      0.03247    -0.64958
    8     1.00000        1.04122     -0.04122    -0.69080
    9     1.00000        1.04057     -0.04057    -0.73137
   10     0.97872        1.04342     -0.06469    -0.79606
   11     1.19565        1.06153      0.13412    -0.66194
   12     1.16667        1.03598      0.13068    -0.53126


                 ANALYSIS OF ERROR TERMS

                               MEAN       STD DEV

          BEFORE SPLIT       -0.06932     0.08323

          AFTER SPLIT         0.02312     0.25019
```



CUMULATIVE ERROR FOR
CONSOLIDATED CANADIAN FARADAY

```
   DATA FOR STOCK NO.  9      WHITE EAGLE INTERNATIONAL

                        JSPLIT EQUALS     52
                        JFIRST EQUALS      1
                        JLAST  EQUALS    124


       REGRESSION STATISTICS BASED ON    99  OBSERVATIONS
     A             B         CORR       SEY          SEA          SEB

 -5.17E-01   1.54E 00   0.253   2.36E-01   6.00E-01   5.97E-01


      DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
     MONTH  OBSERVATION  PREDICTION       ERROR   CUM ERROR

      -12       1.00000        1.06094     -0.06094    -0.06094
      -11       0.88889        0.97545     -0.08656    -0.14750
      -10       1.12500        1.01977      0.10523    -0.04227
       -9       0.77778        1.10384     -0.32606    -0.36833
       -8       1.00000        1.01398     -0.01398    -0.38231
       -7       1.00000        1.09370     -0.09370    -0.47601
       -6       1.00000        0.98971      0.01029    -0.46572
       -5       1.00000        1.06571     -0.06571    -0.53142
       -4       1.00000        1.06338     -0.06338    -0.59480
       -3       1.00000        1.05589     -0.05589    -0.65069
       -2       0.71429        1.05029     -0.33600    -0.98669
       -1       1.20000        1.02805      0.17195    -0.81474

        0       0.80000        1.04903     -0.24903    -1.06377
        1       1.20833        1.03656      0.17177    -0.89200
        2       0.79310        1.05646     -0.26336    -1.15536
        3       1.04348        1.00471      0.03876    -1.11660
        4       0.95833        1.07283     -0.11449    -1.23109
        5       0.95652        1.02541     -0.06889    -1.29997
        6       0.77273        1.02360     -0.25088    -1.55085
        7       1.00000        1.03145     -0.03145    -1.58230
        8       1.64706        1.08136      0.56570    -1.01660
        9       0.89286        1.01097     -0.11811    -1.13471
       10       0.88000        1.00532     -0.12532    -1.26003
       11       1.04545        1.08982     -0.04437    -1.30440
       12       0.86957        0.99830     -0.12873    -1.43313

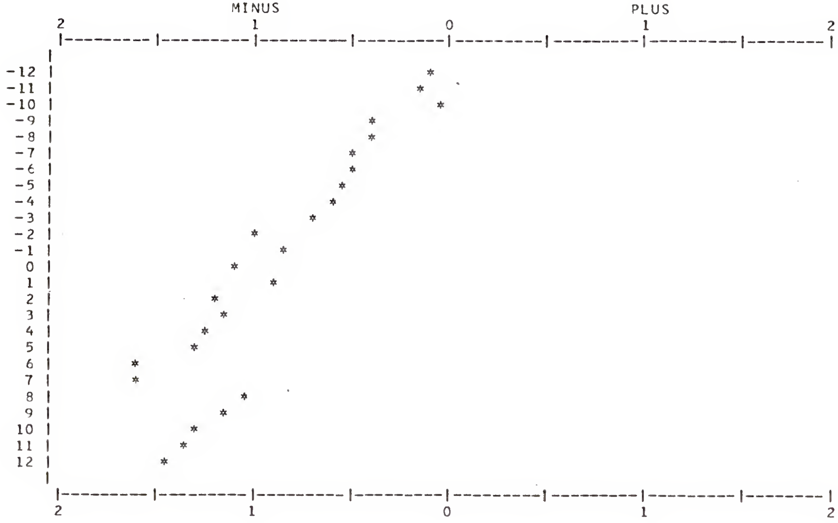

                      ANALYSIS OF ERROR TERMS

                                        MEAN        STD DEV

               BEFORE SPLIT          -0.06790      0.14656

               AFTER SPLIT           -0.04757      0.22041
```

CUMULATIVE ERROR FOR
WHITE EAGLE.INTERNATIONAL



```
DATA FOR STOCK NO. 10      NUCOR

                    JSPLIT EQUALS    144
                    JFIRST EQUALS      1
                    JLAST  EQUALS    164


   REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
  A            B          CORR      SEY          SEA          SEB

-1.29E-01   1.14E 00  0.160    2.62E-01   6.06E-01   6.02E-01



   DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
  MONTH  OBSERVATION  PREDICTION       ERROR   CUM ERROR

   -12      1.26316       1.04479     0.21837     0.21837
   -11      1.04167       1.04249    -0.00082     0.21755
   -10      1.00000       1.06570    -0.06570     0.15185
    -9      1.20000       1.06330     0.13670     0.28854
    -8      0.86667       0.96816    -0.10149     0.18705
    -7      0.92308       1.00252    -0.07945     0.10761
    -6      1.12500       0.96296     0.16204     0.26965
    -5      1.00000       1.08014    -0.08014     0.18952
    -4      1.15185       1.01002     0.14184     0.33135
    -3      0.99678       0.96567     0.03111     0.36246
    -2      0.96774       1.02078    -0.05303     0.30943
    -1      0.96667       1.10911    -0.14244     0.16699

     0      1.03448       1.04850    -0.01402     0.15297
     1      1.13333       1.04353     0.08980     0.24277
     2      0.97059       1.03553    -0.06494     0.17783
     3      1.24242       1.02188     0.22054     0.39837
     4      1.06707       1.03563     0.03145     0.42982
     5      1.08571       0.99539     0.09033     0.52015
     6      0.88947       1.02500    -0.13553     0.38462
     7      0.95858       1.05534    -0.09676     0.28786
     8      1.02469       1.00648     0.01821     0.30607
     9      0.96988       1.01426    -0.04438     0.26169
    10      1.06832       1.07233    -0.00401     0.25768
    11      0.89186       1.03552    -0.14366     0.11402
    12      0.97386       1.01300    -0.03914     0.07488

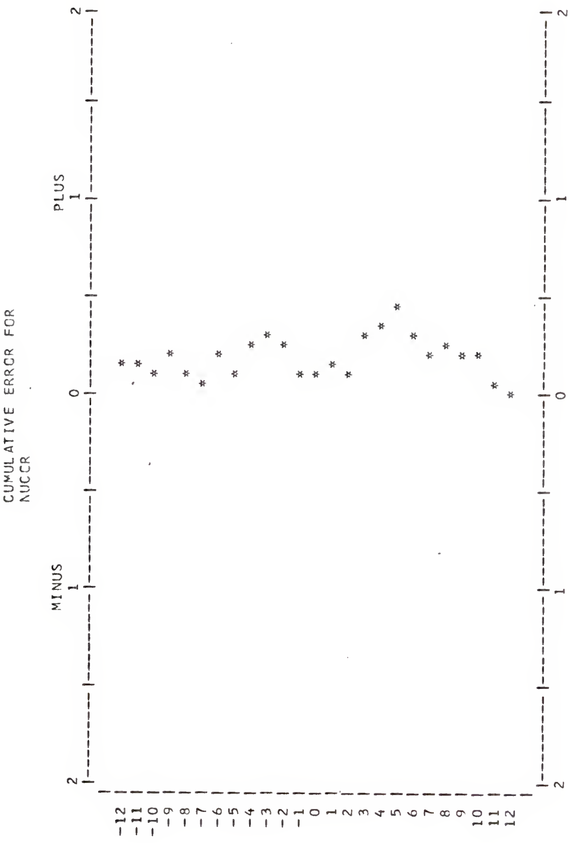


                  ANALYSIS OF ERROR TERMS

                                    MEAN       STD DEV

          BEFORE SPLIT            0.01392     0.12130

          AFTER SPLIT            -0.00709     0.10076
```


CUMULATIVE ERROR FOR
NUCCR
MINUS
PLUS
2
1
0
1
2
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
11
12

```
DATA FOR STOCK NO. 11      ROOSEVELT RACEWAY

                    JSPLIT EQUALS    39
                    JFIRST EQUALS     1
                    JLAST  EQUALS   133


     REGRESSION STATISTICS BASED ON  108  OBSERVATIONS
  A            B           CORR      SEY           SEA          SEB

5.38E-01   4.76E-01   0.172    9.58E-02    2.67E-01    2.65E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH   OBSERVATION   PREDICTION        ERROR     CUM ERROR

     -12      0.95122         0.98144      -0.03022    -0.03022
     -11      0.84615         0.97958      -0.13343    -0.16365
     -10      0.93939         0.97578      -0.03638    -0.20003
      -9      1.03226         1.04622      -0.01396    -0.21399
      -8      1.00000         1.02292      -0.02292    -0.23691
      -7      1.00000         0.99193       0.00807    -0.22884
      -6      0.93750         1.02051      -0.08301    -0.31185
      -5      1.06667         1.06608       0.00059    -0.31126
      -4      0.96875         1.02159      -0.05284    -0.36410
      -3      1.06452         1.03802       0.02649    -0.33760
      -2      1.00727         0.99909       0.00818    -0.32942
      -1      1.03030         1.03573      -0.00543    -0.33485

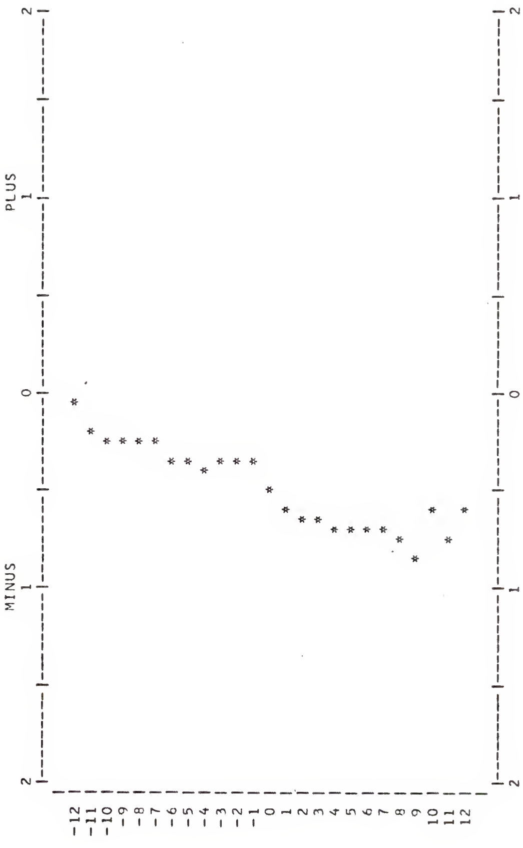
       0      0.91176         1.04170      -0.12994    -0.46479
       1      0.93516         1.02722      -0.09206    -0.55685
       2      0.95652         1.00072      -0.04420    -0.60105
       3      0.99091         1.01446      -0.02355    -0.62460
       4      0.99963         1.04052      -0.04089    -0.66549
       5      1.00000         1.01267      -0.01267    -0.67815
       6      1.01852         1.03738      -0.01886    -0.69701
       7      1.00873         1.00514       0.00359    -0.69342
       8      0.99091         1.02870      -0.03779    -0.73121
       9      0.95413         1.02798      -0.07385    -0.80506
      10      1.23269         1.02566       0.20704    -0.59803
      11      0.92126         1.02392      -0.10266    -0.70069
      12      1.16239         1.01703       0.14537    -0.55532


                    ANALYSIS OF ERROR TERMS

                                      MEAN        STD DEV

            BEFORE SPLIT           -0.02790      0.04468

            AFTER SPLIT            -0.01696      0.09476
```



CUMULATIVE ERROR FOR ROOSEVELT RACEWAY

```
DATA FOR STOCK NO. 12      STYLON

                        JSPLIT EQUALS     34
                        JFIRST EQUALS      1
                        JLAST  EQUALS    123


      REGRESSION STATISTICS BASED ON    98  OBSERVATIONS
    A            B          CORR       SEY          SEA          SEB

-9.78E-01   2.00E 00  0.279   2.35E-01   7.07E-01   7.02E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION  PREDICTION       ERROR    CUM ERROR

     -12       0.91892       1.09256     -0.17364    -0.17364
     -11       1.01471       1.05499     -0.04028    -0.21392
     -10       0.97059       0.95749      0.01310    -0.20082
      -9       1.00000       1.05562     -0.05562    -0.25644
      -8       0.94697       1.04323     -0.09626    -0.35270
      -7       1.00000       0.88392      0.11608    -0.23662
      -6       0.87097       0.87611     -0.00514    -0.24176
      -5       0.93519       0.86013      0.07506    -0.16670
      -4       0.96000       1.15603     -0.19603    -0.36273
      -3       0.83333       1.05815     -0.22481    -0.58755
      -2       1.01250       0.92800      0.08450    -0.50305
      -1       0.80000       1.04803     -0.24803    -0.75108

       0       0.90625       1.23946     -0.33321    -1.08429
       1       0.94828       1.05256     -0.10429    -1.18857
       2       0.96296       1.12160     -0.15864    -1.34721
       3       1.00000       0.95806      0.04194    -1.30526
       4       0.98077       1.11199     -0.13122    -1.43648
       5       0.98039       1.13705     -0.15666    -1.59314
       6       1.08000       1.07624      0.00376    -1.58938
       7       1.12963       0.96491      0.16472    -1.42466
       8       0.93443       1.02262     -0.08820    -1.51286
       9       1.08772       1.13209     -0.04437    -1.55723
      10       1.00000       1.01509     -0.01509    -1.57232
      11       0.88710       1.11889     -0.23179    -1.80411
      12       0.94545       0.98348     -0.03802    -1.84213

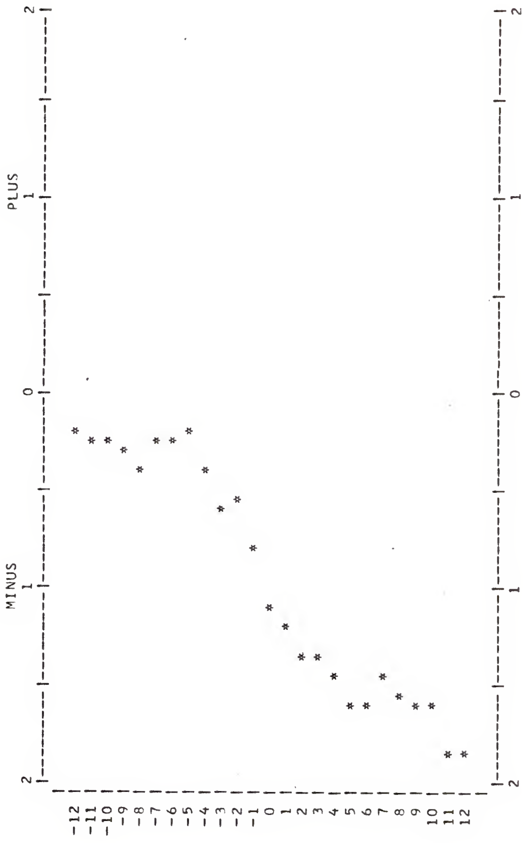

                      ANALYSIS OF ERROR TERMS

                                          MEAN       STD DEV

               BEFORE  SPLIT           -0.06259      0.12579

               AFTER  SPLIT            -0.08393      0.12626
```

CUMULATIVE ERRCR FOR
STYLON



```
DATA FOR STOCK NO. 13     CADENCE INDUSTRIES

                        JSPLIT EQUALS    77
                        JFIRST EQUALS     1
                        JLAST  EQUALS   164


     REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
   A             B        CORR      SEY          SEA          SEB

-1.29E 00   2.27E 00  0.532   1.32E-01   3.11E-01   3.08E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION       ERROR    CUM ERROR

    -12      0.92500        0.87645      0.04855     0.04855
    -11      0.86486        1.01337     -0.14850    -0.09996
    -10      1.03125        1.03073      0.00052    -0.09944
     -9      1.00000        1.07212     -0.07212    -0.17156
     -8      1.00000        1.06147     -0.06147    -0.23303
     -7      1.15152        0.94595      0.20557    -0.02747
     -6      0.86842        1.00862     -0.14020    -0.16766
     -5      1.24242        0.98250      0.25993     0.09226
     -4      1.09756        0.92975      0.16781     0.26007
     -3      1.00000        0.92659      0.07341     0.33348
     -2      0.95556        0.99374     -0.03819     0.29529
     -1      0.83721        0.87376     -0.03655     0.25875

      0      0.80556        0.92399     -0.11844     0.14031
      1      0.81897        0.94158     -0.12261     0.01770
      2      0.71579        0.82473     -0.10894    -0.09124
      3      1.20588        0.93248      0.27340     0.18216
      4      0.84146        1.08768     -0.24622    -0.06406
      5      1.13043        0.97068      0.15976     0.09570
      6      1.21795        0.95895      0.25900     0.35470
      7      1.14737        1.16633     -0.01896     0.33574
      8      1.11009        0.98923      0.12086     0.45660
      9      1.09917        1.07980      0.01938     0.47598
     10      1.05263        1.09513     -0.04249     0.43348
     11      1.42857        0.86371      0.56486     0.99834
     12      1.20500        1.01663      0.18837     1.18671

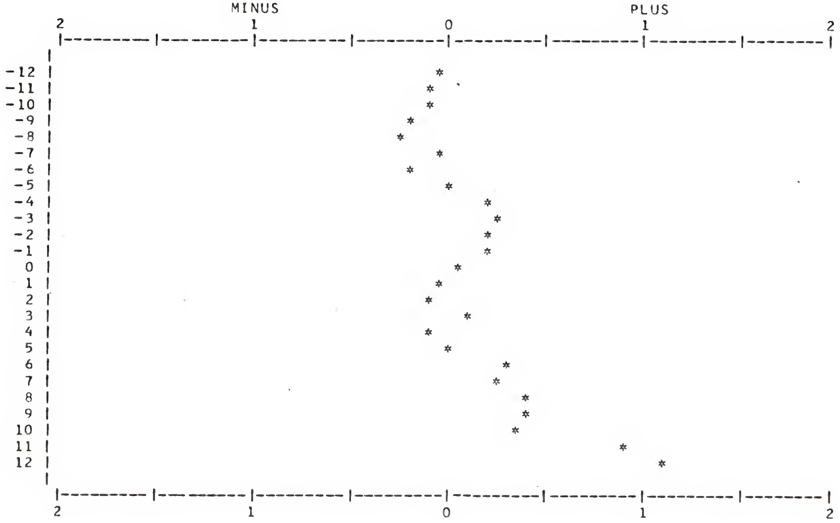

                     ANALYSIS OF ERROR TERMS

                                     MEAN       STD DEV

            BEFORE SPLIT           0.02156      0.13267

            AFTER SPLIT            0.07138      0.21878
```

CUMULATIVE ERROR FOR
CADENCE INDUSTRIES



```
DATA FOR STOCK NO. 14     NATIONAL UNION ELECTRIC

                    JSPLIT EQUALS    52
                    JFIRST EQUALS     1
                    JLAST  EQUALS   164


   REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
 A            B         CORR      SEY          SEA         SEB

-6.72E-01   1.67E 00  0.440   1.31E-01   2.94E-01   2.92E-01



  DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
 MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

  -12      1.05882       1.04377     0.01505    0.01505
  -11      1.00111       0.95080     0.05031    0.06536
  -10      0.94444       0.99900    -0.05455    0.01080
   -9      1.05882       1.09041    -0.03159   -0.02079
   -8      1.00111       0.99271     0.00841   -0.01238
   -7      0.88889       1.07939    -0.19050   -0.20288
   -6      1.00000       0.96631     0.03369   -0.16919
   -5      1.06375       1.04895     0.01480   -0.15439
   -4      1.11765       1.04642     0.07123   -0.08316
   -3      0.89474       1.03828    -0.14354   -0.22670
   -2      1.12941       1.03218     0.09723   -0.12947
   -1      1.00000       1.00800    -0.00800   -0.13748

    0      1.03158       1.03082     0.00076   -0.13672
    1      1.12245       1.01726     0.10519   -0.03153
    2      1.09174       1.03890     0.05284    0.02132
    3      1.00840       0.98263     0.02577    0.04709
    4      0.95000       1.05669    -0.10669   -0.05960
    5      0.93805       1.00513    -0.06708   -0.12668
    6      1.03773       1.00317     0.03457   -0.09211
    7      0.93636       1.01170    -0.07533   -0.16745
    8      1.00000       1.06597    -0.06597   -0.23342
    9      1.02941       0.98943     0.03998   -0.19344
   10      1.04190       0.98329     0.05861   -0.13482
   11      1.02778       1.07517    -0.04739   -0.18222
   12      1.17117       0.97565     0.19552    0.01330

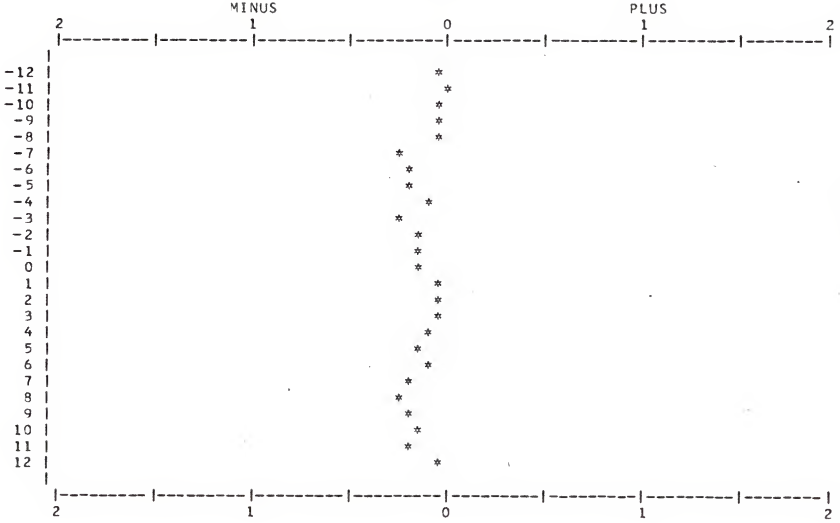

                  ANALYSIS OF ERROR TERMS

                                 MEAN       STD DEV

           BEFORE SPLIT        -0.01146     0.08424

           AFTER SPLIT          0.01160     0.08435
```

CUMULATIVE ERROR FOR
NATIONAL UNION ELECTRIC



```
DATA FOR STOCK NO. 15     COLT INDUSTRIES

                  JSPLIT EQUALS    52
                  JFIRST EQUALS     1
                  JLAST  EQUALS   164


     REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
   A           B          CORR       SEY          SEA         SEB

-8.61E-01   1.85E 00   0.564   1.04E-01   2.33E-01   2.31E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION  PREDICTION       ERROR    CUM ERROR

     -12      1.17143       1.04122     0.13021     0.13021
     -11      1.14634       0.93814     0.20820     0.33841
     -10      0.89362       0.99157    -0.09796     0.24046
      -9      1.04762       1.09293    -0.04531     0.19514
      -8      0.88636       0.98460    -0.09823     0.09691
      -7      1.02564       1.08071    -0.05507     0.04184
      -6      0.97500       0.95533     0.01967     0.06151
      -5      1.23077       1.04696     0.18381     0.24532
      -4      1.02083       1.04415    -0.02332     0.22201
      -3      1.04082       1.03513     0.00569     0.22770
      -2      0.82353       1.02837    -0.20484     0.02286
      -1      1.02381       1.00156     0.02225     0.04511

       0      0.84496       1.02685    -0.18189    -0.13678
       1      0.83486       1.01182    -0.17696    -0.31374
       2      1.12088       1.03582     0.08506    -0.22868
       3      0.93137       0.97342    -0.04205    -0.27073
       4      1.13684       1.05554     0.08130    -0.18943
       5      0.97222       0.99837    -0.02615    -0.21558
       6      0.97143       0.99620    -0.02477    -0.24035
       7      0.94118       1.00566    -0.06448    -0.30483
       8      1.17708       1.06583     0.11125    -0.19358
       9      1.21239       0.98096     0.23143     0.03784
      10      0.95620       0.97416    -0.01795     0.01989
      11      1.09160       1.07603     0.01557     0.03546
      12      0.91608       0.96569    -0.04960    -0.01414

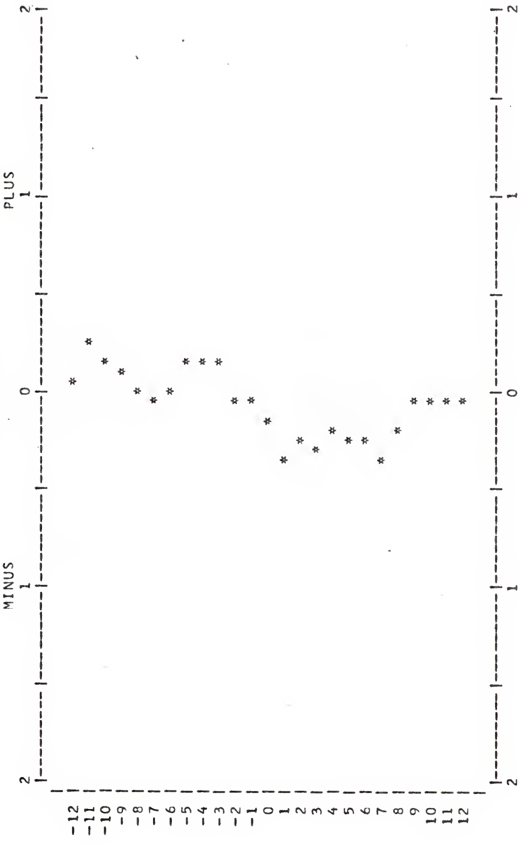

                   ANALYSIS OF ERROR TERMS

                                  MEAN        STD DEV

             BEFORE SPLIT        0.00376      0.12123

             AFTER SPLIT        -0.00456      0.11334
```

CUMULATIVE ERROR FOR
COLT INDUSTRIES



```
DATA FOR STOCK NO. 16      CHARAN INDUSTRIES

                      JSPLIT EQUALS     50
                      JFIRST EQUALS     17
                      JLAST  EQUALS    164


       REGRESSION STATISTICS BASED ON  123  OBSERVATIONS
     A            B           CORR       SEY          SEA           SEB

-7.24E-01    1.72E 00   0.335    1.89E-01    4.42E-01    4.40E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION   PREDICTION       ERROR    CUM ERROR

     -12       0.93333         1.06949     -0.13616     -0.13616
     -11       0.92857         1.09100     -0.16243     -0.29858
     -10       1.00000         1.03881     -0.03881     -0.33739
      -9       0.92308         0.94328     -0.02020     -0.35759
      -8       0.91667         0.99280     -0.07614     -0.43373
      -7       1.00000         1.08673     -0.08673     -0.52046
      -6       1.00909         0.98634      0.02275     -0.49771
      -5       0.90090         1.07541     -0.17451     -0.67222
      -4       0.90000         0.95921     -0.05921     -0.73143
      -3       0.77778         1.04413     -0.26635     -0.99778
      -2       0.85714         1.04153     -0.18438     -1.18217
      -1       1.25000         1.03316      0.21684     -0.96533

       0       0.73333         1.02690     -0.29357     -1.25890
       1       0.86364         1.00206     -0.13842     -1.39732
       2       0.89474         1.02550     -0.13076     -1.52808
       3       0.94118         1.01157     -0.07039     -1.59847
       4       0.87500         1.03380     -0.15880     -1.75727
       5       1.00000         0.97598      0.02402     -1.73325
       6       0.85714         1.05209     -0.19494     -1.92819
       7       1.33333         0.99910      0.33423     -1.59396
       8       0.75000         0.99709     -0.24709     -1.84105
       9       0.91667         1.00585     -0.08919     -1.93023
      10       1.27273         1.06162      0.21110     -1.71913
      11       1.21428         0.98297      0.23132     -1.48781
      12       1.05882         0.97666      0.08216     -1.40565

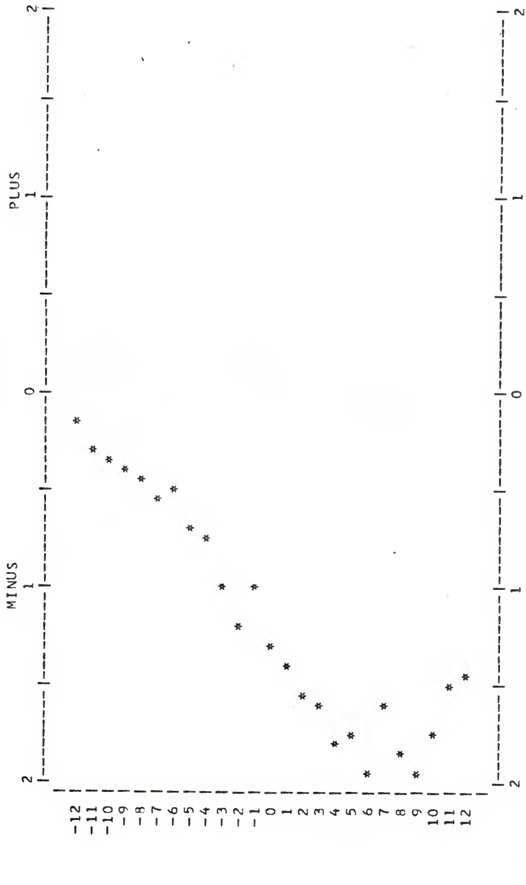

                     ANALYSIS OF ERROR TERMS

                                      MEAN       STD DEV

              BEFORE SPLIT         -0.08044      0.12393

              AFTER SPLIT          -0.03387      0.19618
```

CUMULATIVE ERROR FOR
CHARAN INDUSTRIES



```
DATA FOR STOCK NO. 17     STUDEBAKER-WORTHINGTON

                    JSPLIT EQUALS    64
                    JFIRST EQUALS     1
                    JLAST  EQUALS   164


      REGRESSION STATISTICS BASED ON  139   OBSERVATIONS
   A           B          CORR      SEY         SEA         SEB

-4.22E-01   1.41E 00   0.460   1.04E-01   2.35E-01   2.33E-01


      DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
     MONTH  OBSERVATION  PREDICTION     ERROR    CUM ERROR

      -12     0.92647      1.01975    -0.09328   -0.09328
      -11     1.00000      1.00828    -0.00828   -0.10156
      -10     0.93651      1.02659    -0.09008   -0.19164
       -9     0.93220      0.97896    -0.04675   -0.23839
       -8     0.98182      1.04166    -0.05984   -0.29823
       -7     1.01852      0.99800     0.02051   -0.27771
       -6     0.98182      0.99634    -0.01453   -0.29224
       -5     0.92593      1.00356    -0.07764   -0.36988
       -4     1.14000      1.04951     0.09049   -0.27939
       -3     1.00000      0.98471     0.01529   -0.26410
       -2     0.85965      0.97952    -0.11987   -0.38397
       -1     0.93878      1.05730    -0.11853   -0.50250

        0     0.80000      0.97305    -0.17305   -0.67554
        1     0.84783      0.93119    -0.08336   -0.75891
        2     1.03205      1.01652     0.01553   -0.74338
        3     0.95031      1.02734    -0.07703   -0.82041
        4     0.95425      1.05314    -0.09889   -0.91930
        5     1.05479      1.04650     0.00829   -0.91100
        6     1.12987      0.97450     0.15537   -0.75564
        7     1.09195      1.01356     0.07839   -0.67724
        8     1.07895      0.99728     0.08167   -0.59557
        9     1.51219      0.96441     0.54779   -0.04779
       10     0.99355      0.96244     0.03111   -0.01668
       11     0.90260      1.00429    -0.10169   -0.11837
       12     1.02878      0.92951     0.09927   -0.01910

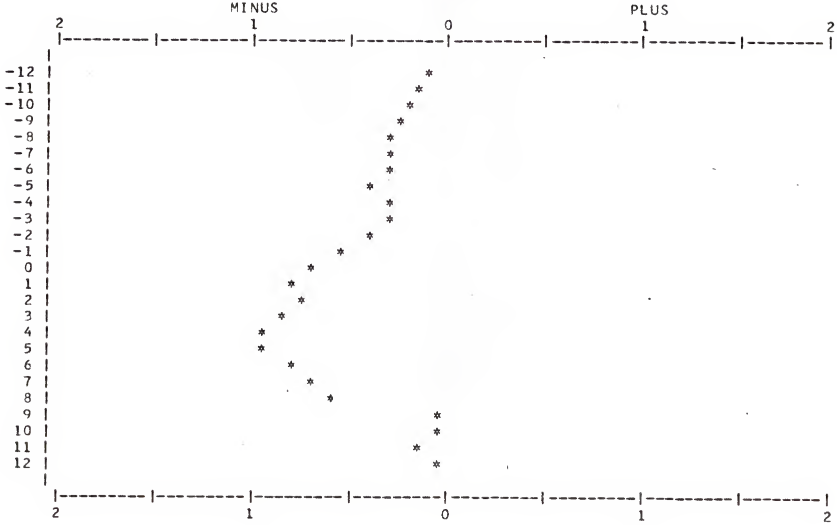

                   ANALYSIS OF ERROR TERMS

                                 MEAN       STD DEV

          BEFORE SPLIT        -0.04187      0.06404

          AFTER SPLIT          0.03718      0.18100
```

CUMULATIVE ERRCR FOR
STUDEBAKER-WORTHINGTON



```
DATA FOR STOCK NO. 18     COMMUNITY DISCOUNT CENTERS

                  JSPLIT EQUALS    66
                  JFIRST EQUALS    24
                  JLAST  EQUALS    96


    REGRESSION STATISTICS BASED ON   48  OBSERVATIONS
  A          B        CORR      SEY        SEA        SEB

5.27E-01  4.87E-01  0.124   1.66E-01  5.80E-01  5.74E-01


     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION  PREDICTION     ERROR    CUM ERROR

     -12     1.00000     1.02528    -0.02528   -0.02528
     -11     1.00000     1.00889    -0.00889   -0.03417
     -10     0.90909     1.03046    -0.12137   -0.15554
      -9     1.10000     1.01544     0.08456   -0.07098
      -8     1.18182     1.01487     0.16695    0.09597
      -7     1.07692     1.01735     0.05957    0.15554
      -6     1.28571     1.03317     0.25255    0.40808
      -5     0.88889     1.01087    -0.12198    0.28610
      -4     0.93750     1.00908    -0.07158    0.21453
      -3     1.06667     1.03585     0.03082    0.24535
      -2     0.87500     1.00685    -0.13185    0.11349
      -1     0.78571     0.99245    -0.20673   -0.09324

       0     0.65455     1.02181    -0.36727   -0.46051
       1     1.13889     1.02554     0.11335   -0.34716
       2     0.85366     1.03442    -0.18076   -0.52791
       3     1.00000     1.03213    -0.03213   -0.56004
       4     1.17143     1.00735     0.16408   -0.39597
       5     0.87805     1.02079    -0.14275   -0.53871
       6     1.25000     1.01519     0.23481   -0.30390
       7     1.08889     1.00388     0.08501   -0.21889
       8     1.02041     1.00320     0.01721   -0.20169
       9     0.88000     1.01760    -0.13760   -0.33929
      10     0.88636     0.99187    -0.10550   -0.44480
      11     0.97436     1.00264    -0.02828   -0.47308
      12     1.05263     1.00641     0.04622   -0.42686


                  ANALYSIS OF ERROR TERMS

                               MEAN       STD DEV

           BEFORE SPLIT      -0.00777     0.13421

           AFTER SPLIT       -0.02566     0.16223
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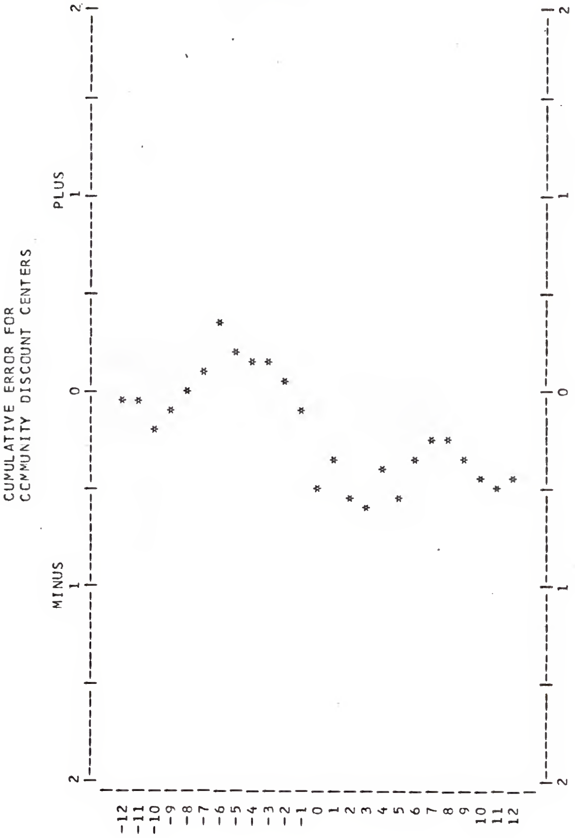
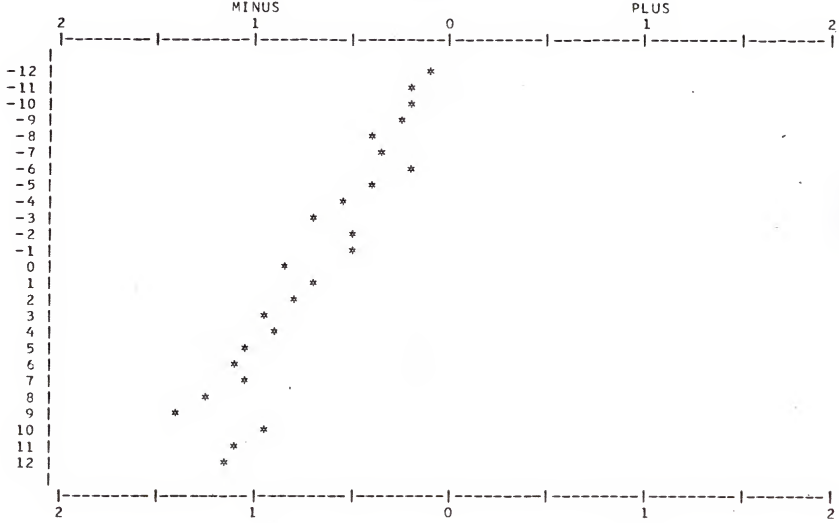


CUMULATIVE ERROR FOR
COMMUNITY DISCOUNT CENTERS

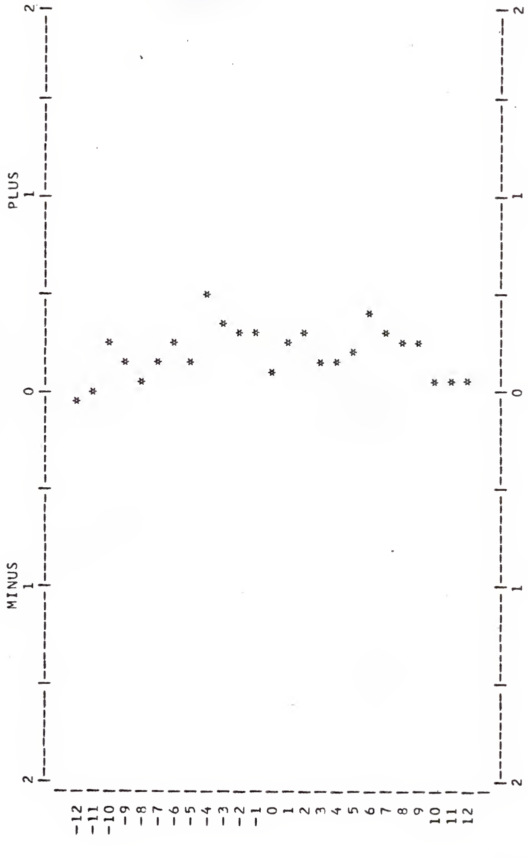
```
DATA FOR STOCK NO. 19     ROYAL AMERICAN INDUSTRIES

                    JSPLIT EQUALS   134
                    JFIRST EQUALS     1
                    JLAST  EQUALS   164


     REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
  A            B          CORR      SEY         SEA         SEB

-4.63E-01   1.46E 00   0.265   1.88E-01   4.60E-01   4.56E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION      ERROR    CUM ERROR

    -12      0.92000      0.99522     -0.07522    -0.07522
    -11      0.78261      0.88270     -0.10009    -0.17531
    -10      0.94444      0.92069      0.02376    -0.15156
     -9      0.88235      0.94036     -0.05801    -0.20957
     -8      0.93333      1.10352     -0.17018    -0.37975
     -7      1.14286      1.07527      0.06759    -0.31216
     -6      1.18750      1.05478      0.13272    -0.17944
     -5      0.78947      1.00299     -0.21351    -0.39295
     -4      0.93333      1.07485     -0.14152    -0.53447
     -3      0.92857      1.07703     -0.14846    -0.68293
     -2      1.23077      1.04124      0.18952    -0.49340
     -1      1.06250      1.03829      0.02421    -0.46920

      0      0.71176      1.06804     -0.35628    -0.82547
      1      1.21488      1.06497      0.14991    -0.67556
      2      0.82313      0.94306     -0.11993    -0.79549
      3      0.87603      0.98709     -0.11106    -0.90655
      4      0.97170      0.93639      0.03530    -0.87125
      5      0.94175      1.08653     -0.14479    -1.01603
      6      0.95876      0.99669     -0.03793    -1.05396
      7      0.98925      0.93987      0.04937    -1.00458
      8      0.80435      1.01048     -0.20613    -1.21071
      9      0.97297      1.12366     -0.15069    -1.36140
     10      1.45833      1.04600      0.41233    -0.94907
     11      0.92381      1.03964     -0.11583    -1.06489
     12      0.95876      1.02938     -0.07061    -1.13550


                    ANALYSIS OF ERROR TERMS

                                   MEAN       STD DEV

             BEFORE SPLIT        -0.03910     0.12669

             AFTER SPLIT         -0.05125     0.18745
```

CUMULATIVE ERROR FOR
ROYAL AMERICAN INDUSTRIES



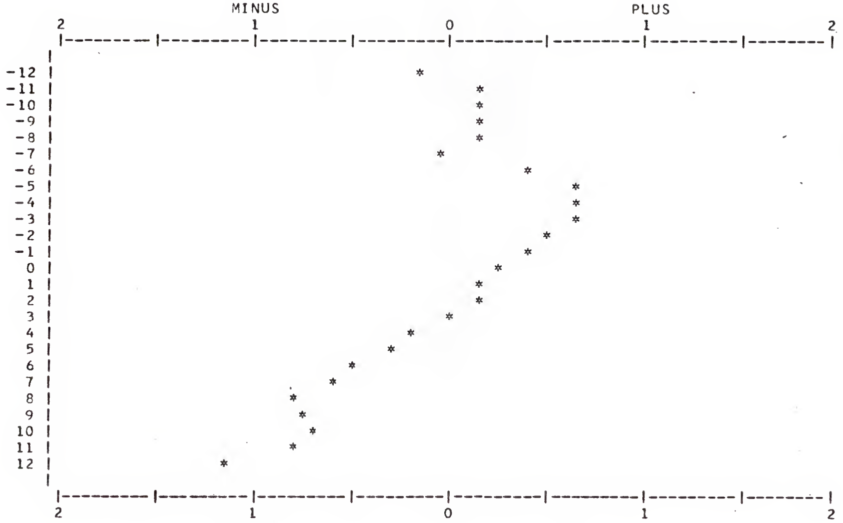
```
DATA FOR STOCK NO. 20     GREAT BASIN PETROLEUM

                    JSPLIT EQUALS   106
                    JFIRST EQUALS    24
                    JLAST  EQUALS   164


      REGRESSION STATISTICS BASED ON  116  OBSERVATIONS
   A           B         CORR       SEY         SEA         SEB

-1.94E-01   1.19E 00   0.271   1.59E-01   3.98E-01   3.95E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

     -12      0.96970      0.98884    -0.01915   -0.01915
     -11      1.12500      1.02867     0.09633    0.07718
     -10      1.19444      0.93651     0.25793    0.33511
      -9      0.83721      0.96805    -0.13084    0.20427
      -8      0.94444      1.01236    -0.06792    0.13635
      -7      1.20588      1.10943     0.09645    0.23281
      -6      1.09756      0.99376     0.10380    0.33661
      -5      0.88889      1.00350    -0.11461    0.22199
      -4      1.30000      0.97165     0.32835    0.55034
      -3      0.88462      1.00920    -0.12459    0.42576
      -2      1.00000      1.03522    -0.03522    0.39054
      -1      0.97826      0.99833    -0.02007    0.37047

       0      0.86667      1.04587    -0.17920    0.19127
       1      1.05128      0.93940     0.11188    0.30315
       2      1.06098      0.97319     0.08779    0.39094
       3      0.78161      0.95275    -0.17114    0.21980
       4      1.04412      1.05384    -0.00972    0.21008
       5      1.07042      1.01740     0.05302    0.26310
       6      1.19737      0.99581     0.20155    0.46465
       7      0.83516      0.94369    -0.10853    0.35613
       8      0.90789      0.92267    -0.01478    0.34135
       9      1.02899      1.05402    -0.02503    0.31631
      10      0.77465      0.96522    -0.19057    0.12574
      11      1.05455      1.04049     0.01406    0.13980
      12      0.94828      0.94795     0.00033    0.14012


                  ANALYSIS OF ERROR TERMS

                                      MEAN      STD DEV

            BEFORE SPLIT            0.03087     0.14914

            AFTER SPLIT            -0.01772     0.11910
```

CUMULATIVE ERRCR FOR
GREAT BASIN PETROLEUM

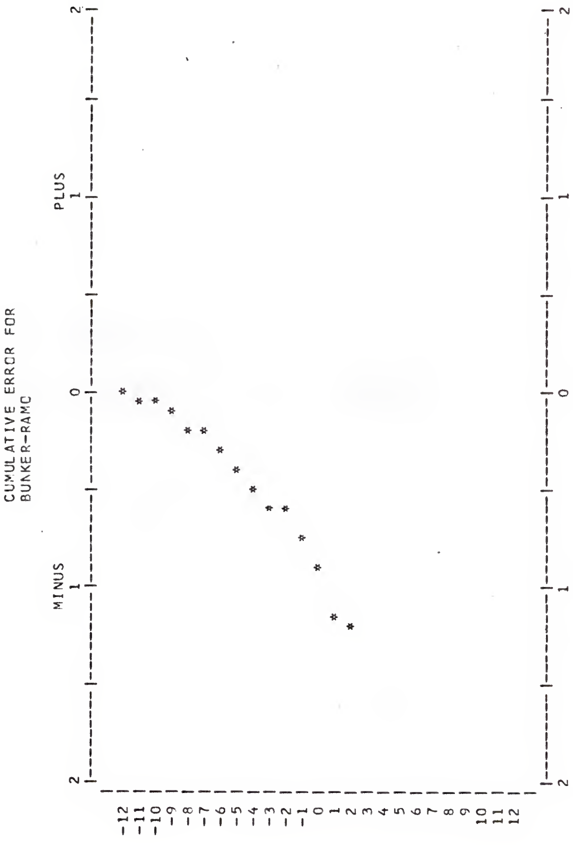


```
DATA FOR STOCK NO. 21     CABOL ENTERPRIZES

                    JSPLIT EQUALS    21
                    JFIRST EQUALS     1
                    JLAST  EQUALS    36


   REGRESSION STATISTICS BASED ON    11  OBSERVATIONS
  A           B         CORR      SEY         SEA        SEB

9.58E-01   3.34E-02  0.006   2.54E-01   1.81E 00   1.79E 00


  DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
 MONTH  OBSERVATION  PREDICTION       ERROR    CUM ERROR

  -12      0.85714      0.99165     -0.13451    -0.13451
  -11      1.33333      0.99290      0.34043     0.20592
  -10      1.00000      0.99289      0.00711     0.21304
   -9      1.00000      0.99384      0.00616     0.21919
   -8      1.00000      0.99269      0.00731     0.22651
   -7      0.75000      0.99235     -0.24235    -0.01584
   -6      1.50000      0.99177      0.50823     0.49239
   -5      1.22222      0.99258      0.22964     0.72203
   -4      1.00000      0.99121      0.00879     0.73082
   -3      1.00000      0.99295      0.00705     0.73787
   -2      0.81818      0.99242     -0.17424     0.56364
   -1      0.88889      0.99142     -0.10254     0.46110

    0      0.87500      0.99272     -0.11772     0.34338
    1      0.85714      0.99291     -0.13577     0.20761
    2      1.00000      0.99229      0.00771     0.21532
    3      0.85000      0.99066     -0.14066     0.07466
    4      0.74510      0.99230     -0.24720    -0.17254
    5      0.89474      0.99209     -0.09735    -0.26989
    6      0.76471      0.98943     -0.22472    -0.49461
    7      0.88462      0.98930     -0.10468    -0.59929
    8      0.82609      0.98903     -0.16294    -0.76223
    9      1.05263      0.99397      0.05866    -0.70358
   10      1.00000      0.99234      0.00766    -0.69592
   11      0.90000      0.99016     -0.09016    -0.78608
   12      0.66667      0.99217     -0.32550    -1.11158


                  ANALYSIS OF ERROR TERMS

                                 MEAN       STD DEV

         BEFORE SPLIT           0.03843     0.21892

         AFTER SPLIT           -0.12098     0.10726
```

CUMULATIVE ERROR FOR
CABOL ENTERPRIZES

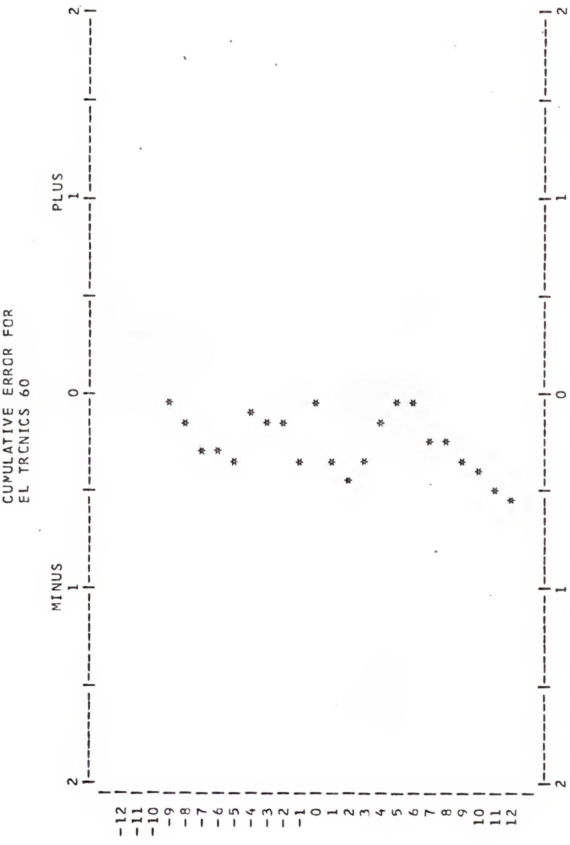


```
DATA FOR STOCK NO. 22     BUNKER-RAMO

                    JSPLIT EQUALS   159
                    JFIRST EQUALS    73
                    JLAST  EQUALS   161


    REGRESSION STATISTICS BASED ON   74  OBSERVATIONS
  A             B         CORR       SEY         SEA          SEB

-1.68E 00   2.68E 00   0.623    1.38E-01   3.98E-01   3.96E-01



   DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
  MONTH  OBSERVATION  PREDICTION        ERROR    CUM ERROR

   -12     1.09575       1.01446       0.08129     0.08129
   -11     0.94175       1.04666      -0.10491    -0.02362
   -10     0.98969       0.95238       0.03732     0.01369
    -9     0.93750       1.02177      -0.08427    -0.07058
    -8     0.96667       1.09285      -0.12619    -0.19677
    -7     0.97701       0.97838      -0.00137    -0.19814
    -6     0.91765       0.99659      -0.07895    -0.27708
    -5     1.01282       1.13266      -0.11984    -0.39692
    -4     0.97721       1.04641      -0.06920    -0.46612
    -3     0.90909       0.99365      -0.08456    -0.55068
    -2     0.87143       0.89882      -0.02739    -0.57807
    -1     0.85573       1.01293      -0.15720    -0.73527

     0     0.72429       0.88329      -0.15900    -0.89427
     1     0.70796       0.95990      -0.25193    -1.14620
     2     0.97250       0.99579      -0.02329    -1.16948
     3    99.99998      99.99998      99.99998    99.99998
     4    99.99998      99.99998      99.99998    99.99998
     5    99.99998      99.99998      99.99998    99.99998
     6    99.99998      99.99998      99.99998    99.99998
     7    99.99998      99.99998      99.99998    99.99998
     8    99.99998      99.99998      99.99998    99.99998
     9    99.99998      99.99998      99.99998    99.99998
    10    99.99998      99.99998      99.99998    99.99998
    11    99.99998      99.99998      99.99998    99.99998
    12    99.99998      99.99998      99.99998    99.99998


                   ANALYSIS OF ERROR TERMS

                                  MEAN      STD DEV

          BEFORE SPLIT          -0.06127    0.07070

          AFTER SPLIT           -0.14474    0.11499
```



CUMULATIVE ERROR FOR BUNKER-RAMO

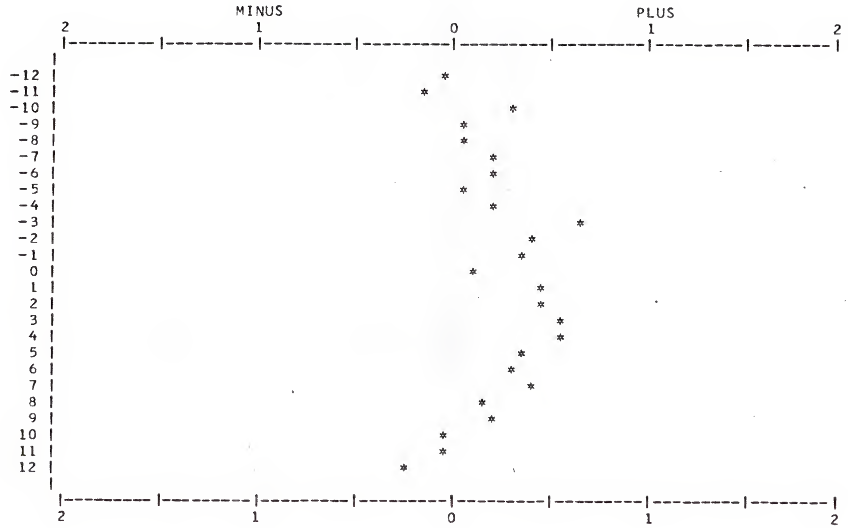
```
DATA FOR STOCK NO. 23     EL TRCNICS 60

                         JSPLIT EQUALS     10
                         JFIRST EQUALS      1
                         JLAST  EQUALS     89


        REGRESSICN STATISTICS BASED CN    67  CBSERVATIONS
     A             B          CORR      SEY          SEA          SEB

-1.C4E-C1    1.1CE 00   0.248    1.61E-01    5.38E-01    5.34E-01



       DETAILS FOR PERIOD SURRCUNDING REVERSE STOCK SPLIT
      MONTH   OBSERVATION   PREDICTICN       ERROR     CUM ERROR

       -12      99.99998      99.99998      99.99998     99.99998
       -11      99.99998      99.99998      99.99998     99.99998
       -1C      99.99998      99.99998      99.99998     99.99998
       -9        1.C0000       C.99883       0.00117      0.00117
       -8        0.85714       0.98181      -0.12467     -0.12349
       -7        0.83333       0.97407      -0.14073     -0.26423
       -6        1.C0000       1.03390      -0.03390     -0.29812
       -5        1.00000       1.02857      -0.02857     -0.32669
       -4        1.20000       0.96928       0.23072     -0.09597
       -3        1.C0000       1.02347      -0.02347     -0.11944
       -2        C.91667       0.93319      -0.01652     -0.13597
       -1        0.81818       0.99604      -0.17786     -0.31382

        C        1.37778       1.03730       0.34047      0.02665
        1        C.67742       1.03680      -0.35938     -0.33272
        2        1.C000C       1.06844      -0.06844     -0.40116
        3        1.09524       1.03030       0.06494     -0.33622
        4        1.21739       1.01910       0.19829     -0.13793
        5        1.17857       0.99993       0.17864      0.04070
        6        C.95455       1.02672      -0.07217     -0.03147
        7        C.80952       0.98150      -0.17197     -0.20344
        8        1.C000C       1.03877      -0.03877     -0.24221
        9        C.96078       1.02143      -0.06064     -0.30285
       1C        C.89796       0.98859      -0.09063     -0.39349
       11        0.93182       1.03147      -0.09965     -0.49314
       12        1.02439       1.03772      -0.01333     -0.50647


                     ANALYSIS CF ERRCR TERMS

                                    MEAN        STD DEV

             BEFORE SPLIT        -0.03487      0.11835

             AFTER SPLIT         -0.01482      0.17810
```



CUMULATIVE ERROR FOR
EL TRCNICS 60

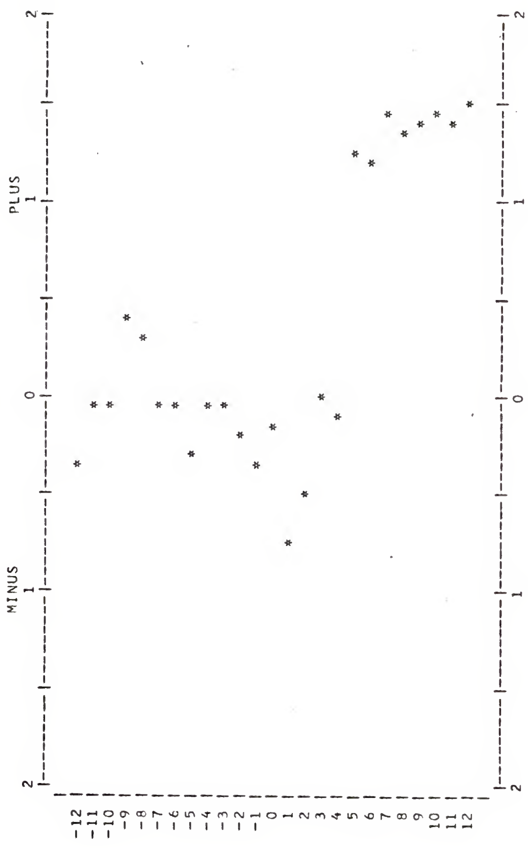
```
       DATA FOR STOCK NO. 24      EL TRCNICS 68

                          JSPLIT EQUALS   103
                          JFIRST EQUALS    49
                          JLAST  EQUALS   164


          REGRESSION STATISTICS BASED ON    91   OBSERVATIONS
       A             B         CORR       SEY          SEA          SEB

  -3.20E-01    1.33E 00   0.328    1.35E-01    4.10E-01    4.07E-01



         DETAILS FOR PERIOD SURRCUNDING REVERSE STOCK SPLIT
         MONTH   OBSERVATION   PREDICTICN       ERROR    CUM ERROR

          -12       1.C0000       0.99941     0.00059     0.00059
          -11       0.94444       1.07064    -0.12619    -0.12560
          -1C       1.47C59       0.99406     0.47653     0.35092
           -9       0.80000       1.00751    -0.20751     0.14341
           -8       1.C5000       1.05220    -0.00220     0.14121
           -7       1.C9524       C.94879     0.14645     0.28766
           -6       0.95652       0.98418    -0.02766     0.26000
           -5       0.88636       1.03390    -0.14753     0.11247
           -4       1.28205       1.14281     0.13924     0.25171
           -3       1.4800C       1.01303     0.46697     0.71868
           -2       C.79730       1.02396    -0.22666     0.49202
           -1       C.89831       0.98822    -0.08991     0.40210

            C       0.81132       1.03035    -0.21903     0.18307
            1       1.37984       1.05954     0.32030     0.50338
            2       1.02247       1.01815     0.00432     0.50769
            3       1.18132       1.07149     0.10983     0.61752
            4       0.94419       0.95203    -0.00785     0.60968
            5       0.79803       0.98994    -0.19191     0.41776
            6       0.92593       0.967C1    -0.04109     0.37668
            7       1.16000       1.08044     0.07956     0.45624
            8       C.82759       1.03956    -0.21197     0.24427
            9       1.C2778       1.01533     0.01245     0.25672
           1C       0.69595       0.95685    -0.26090    -0.00418
           11       C.932C4       0.93326    -0.00122    -0.00541
           12       0.87500       1.08064    -0.20564    -0.21105


                         ANALYSIS OF ERROR TERMS

                                            MEAN        STD DEV

                 BEFORE SPLIT            0.03351      0.23616

                 AFTER SPLIT            -0.04717      0.16685
```

CUMULATIVE ERROR FOR
EL TRONICS 68



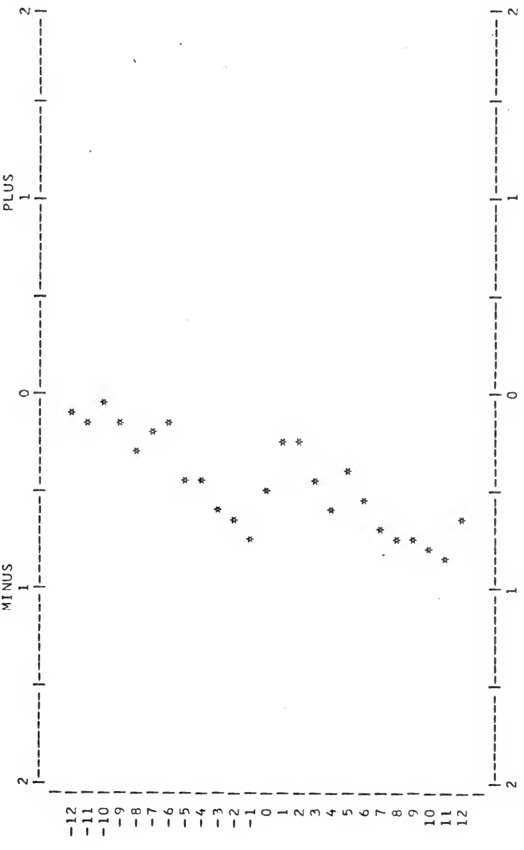
```
DATA FOR STOCK NO. 25     WALTHAM PRECISION INDUSTRIES

                    JSPLIT EQUALS     83
                    JFIRST EQUALS      1
                    JLAST  EQUALS    135


   REGRESSION STATISTICS BASED ON  110  OBSERVATIONS
  A           B          CORR      SEY          SEA           SEB

1.16E-01   8.76E-01  0.166   1.96E-01   5.05E-01   5.01E-01


   DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
  MONTH  OBSERVATION  PREDICTION        ERROR     CUM ERROR

   -12      0.69231         1.00430     -0.31199    -0.31199
   -11      1.33333         0.99422      0.33911     0.02712
   -10      0.91667         0.97387     -0.05720    -0.03008
    -9      1.45455         0.97265      0.48190     0.45181
    -8      0.93750         0.99856     -0.06106     0.39075
    -7      0.60000         0.95226     -0.35226     0.03849
    -6      0.88889         0.97165     -0.08276    -0.04427
    -5      0.75000         0.97843     -0.22843    -0.27270
    -4      1.16667         0.93334      0.23333    -0.03937
    -3      1.00000         0.97492      0.02508    -0.01430
    -2      0.85714         1.03481     -0.17767    -0.19196
    -1      0.83333         0.98966     -0.15633    -0.34829

     0      1.20000         0.98513      0.21487    -0.13342
     1      0.47917         1.06516     -0.58599    -0.71942
     2      1.21739         0.99682      0.22057    -0.49885
     3      1.60714         1.03177      0.57537     0.07653
     4      0.86667         1.03768     -0.17102    -0.09449
     5      2.35897         0.94839      1.41059     1.31610
     6      0.94565         1.00739     -0.06174     1.25436
     7      1.31034         1.04460      0.26575     1.52010
     8      0.88596         0.98318     -0.09722     1.42289
     9      1.07921         1.03002      0.04919     1.47208
    10      1.02752         0.97966      0.04786     1.51994
    11      0.92857         0.98851     -0.05993     1.46000
    12      1.13461         1.01789      0.11672     1.57672


                 ANALYSIS OF ERROR TERMS

                                     MEAN       STD DEV

           BEFORE SPLIT            -0.02902     0.25860

           AFTER SPLIT              0.14808     0.46628
```

CUMULATIVE ERROR FOR
WALTHAM PRECISION INDUSTRIES

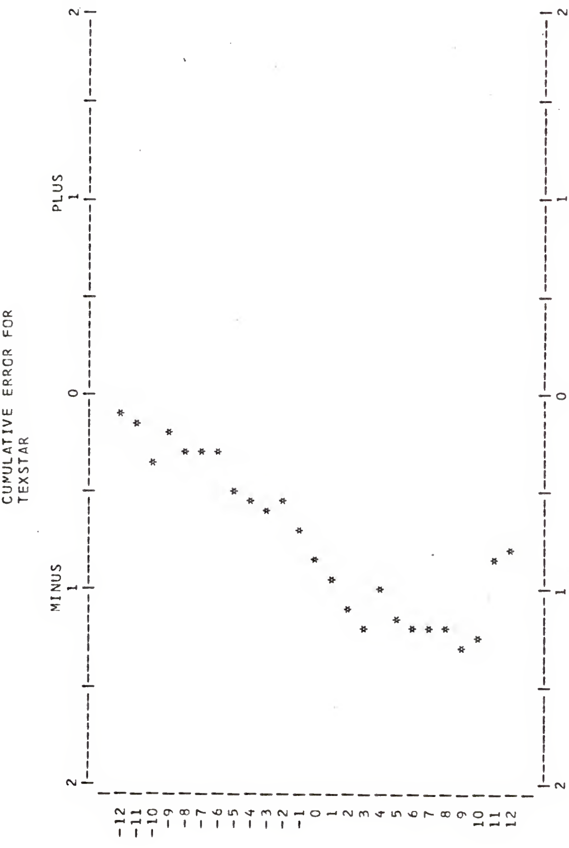


```
DATA FOR STOCK NO. 26     PEEL-ELDER

                    JSPLIT EQUALS    47
                    JFIRST EQUALS     1
                    JLAST  EQUALS   164


        REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
      A           B         CORR       SEY          SEA          SEB

-5.30E-01   1.53E 00   0.324    1.70E-01    3.85E-01    3.83E-01


      DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
      MONTH   OBSERVATION   PREDICTION        ERROR    CUM ERROR

       -12       0.93333       1.02762      -0.09428    -0.09428
       -11       1.07143       1.08058      -0.00915    -0.10344
       -10       1.06667       0.95511       0.11156     0.00812
        -9       0.93750       1.07321      -0.13571    -0.12759
        -8       0.93333       1.09244      -0.15911    -0.28670
        -7       1.14286       1.04578       0.09707    -0.18962
        -6       1.00000       0.96037       0.03963    -0.15000
        -5       0.75000       1.00465      -0.25465    -0.40464
        -4       1.08333       1.08863      -0.00530    -0.40994
        -3       0.84615       0.99887      -0.15271    -0.56265
        -2       1.00000       1.07850      -0.07850    -0.64116
        -1       0.90909       0.97462      -0.06553    -0.70668

         0       1.30000       1.05054       0.24946    -0.45722
         1       1.29231       1.04821       0.24409    -0.21312
         2       1.02381       1.04073      -0.01692    -0.23005
         3       0.83721       1.03513      -0.19792    -0.42797
         4       0.87500       1.01292      -0.13792    -0.56589
         5       1.23809       1.03388       0.20422    -0.36168
         6       0.87179       1.02143      -0.14963    -0.51131
         7       0.86765       1.04130      -0.17366    -0.68497
         8       0.96610       0.98961      -0.02351    -0.70847
         9       1.03509       1.05765      -0.02256    -0.73104
        10       0.98305       1.01028      -0.02723    -0.75827
        11       0.93103       1.00848      -0.07745    -0.83571
        12       1.22222       1.01631       0.20591    -0.62980


                    ANALYSIS OF ERROR TERMS

                                       MEAN       STD DEV

             BEFORE SPLIT            -0.05889     0.11003

             AFTER SPLIT              0.00591     0.16439
```

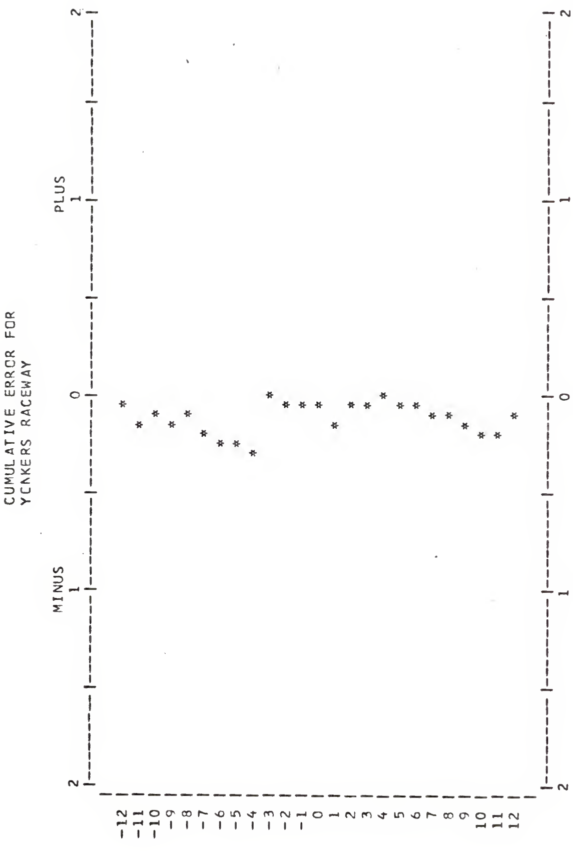
CUMULATIVE ERROR FOR
PEEL-ELDER



```
DATA FOR STOCK NO. 27     TEXSTAR

                    JSPLIT EQUALS    50
                    JFIRST EQUALS     1
                    JLAST  EQUALS   164


      REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
   A           B          CORR      SEY          SEA          SEB

-1.01E 00   2.01E 00  0.372   1.92E-01   4.32E-01   4.30E-01


      DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
     MONTH  OBSERVATION  PREDICTION     ERROR    CUM ERROR

      -12     1.00000      1.09015    -0.09015    -0.09015
      -11     1.08333      1.11539    -0.03206    -0.12221
      -10     0.84615      1.05415    -0.20800    -0.33020
       -9     1.09091      0.94205     0.14886    -0.18134
       -8     0.91667      1.00016    -0.08349    -0.26483
       -7     1.09091      1.11039    -0.01948    -0.28431
       -6     1.00000      0.99257     0.00743    -0.27689
       -5     0.91667      1.09710    -0.18043    -0.45732
       -4     0.90909      0.96074    -0.05165    -0.50897
       -3     1.00000      1.06039    -0.06039    -0.56936
       -2     1.10000      1.05734     0.04266    -0.52670
       -1     0.90909      1.04752    -0.13843    -0.66513

        0     0.88000      1.04017    -0.16017    -0.82530
        1     0.90909      1.01102    -0.10193    -0.92723
        2     0.90000      1.03853    -0.13853    -1.06576
        3     0.91667      1.02218    -0.10551    -1.17127
        4     1.24242      1.04827     0.19415    -0.97712
        5     0.82927      0.98042    -0.15115    -1.12827
        6     1.00000      1.06973    -0.06973    -1.19800
        7     1.02941      1.00755     0.02186    -1.17614
        8     1.02857      1.00519     0.02338    -1.15276
        9     0.91667      1.01547    -0.09881    -1.25157
       10     1.12121      1.08092     0.04029    -1.21128
       11     1.35135      0.98862     0.36273    -0.84854
       12     1.06000      0.98122     0.07878    -0.76976


                  ANALYSIS OF ERROR TERMS

                                  MEAN       STD DEV

          BEFORE SPLIT          -0.05543     0.09769

          AFTER SPLIT           -0.00805     0.15306
```


CUMULATIVE ERROR FOR
TEXSTAR
MINUS
PLUS
2
1
0
1
2
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
11
12

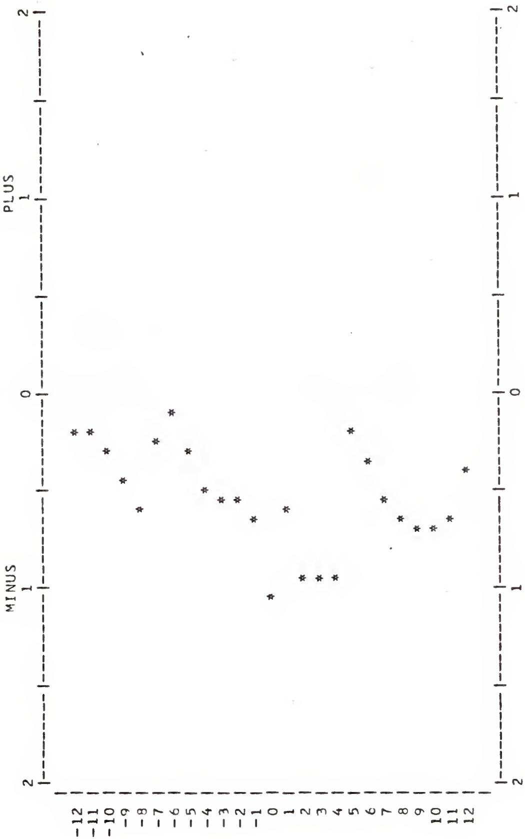
```
DATA FOR STOCK NO. 28     YONKERS RACEWAY

                     JSPLIT EQUALS   104
                     JFIRST EQUALS    22
                     JLAST  EQUALS   148


     REGRESSION STATISTICS BASED ON  102  OBSERVATIONS
  A            B         CORR      SEY         SEA         SEB

4.87E-01   5.21E-01  0.202   9.84E-02   2.54E-01   2.52E-01



    DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

    -12      1.05263      1.03012     0.02251    0.02251
    -11      0.87500      1.00019    -0.12519   -0.10268
    -10      1.05714      1.00545     0.05170   -0.05098
     -9      0.94595      1.02292    -0.07697   -0.12796
     -8      1.02857      0.98249     0.04608   -0.08188
     -7      0.91667      0.99633    -0.07966   -0.16153
     -6      0.97651      1.01576    -0.03925   -0.20078
     -5      1.03125      1.05834    -0.02709   -0.22787
     -4      0.96970      1.00760    -0.03791   -0.26578
     -3      1.35078      1.01188     0.33891    0.07313
     -2      0.90698      0.99790    -0.09093   -0.01780
     -1      1.00000      1.01438    -0.01438   -0.03217

      0      1.03782      1.02579     0.01203   -0.02014
      1      0.91925      1.00961    -0.09035   -0.11049
      2      1.10811      1.03046     0.07765   -0.03284
      3      0.97500      0.98376    -0.00876   -0.04160
      4      1.11321      0.99858     0.11463    0.07303
      5      0.88136      0.98961    -0.10826   -0.03523
      6      1.02179      1.03395    -0.01216   -0.04739
      7      0.97468      1.01797    -0.04329   -0.09068
      8      1.00000      1.00850    -0.00850   -0.09919
      9      0.98312      0.98564    -0.00252   -0.10171
     10      0.90000      0.97642    -0.07642   -0.17813
     11      1.02222      1.03403    -0.01181   -0.18994
     12      1.10435      0.99509     0.10926   -0.08068


                   ANALYSIS OF ERROR TERMS

                                    MEAN      STD DEV

          BEFORE SPLIT           -0.00268     0.12068

          AFTER SPLIT            -0.00373     0.07019
```



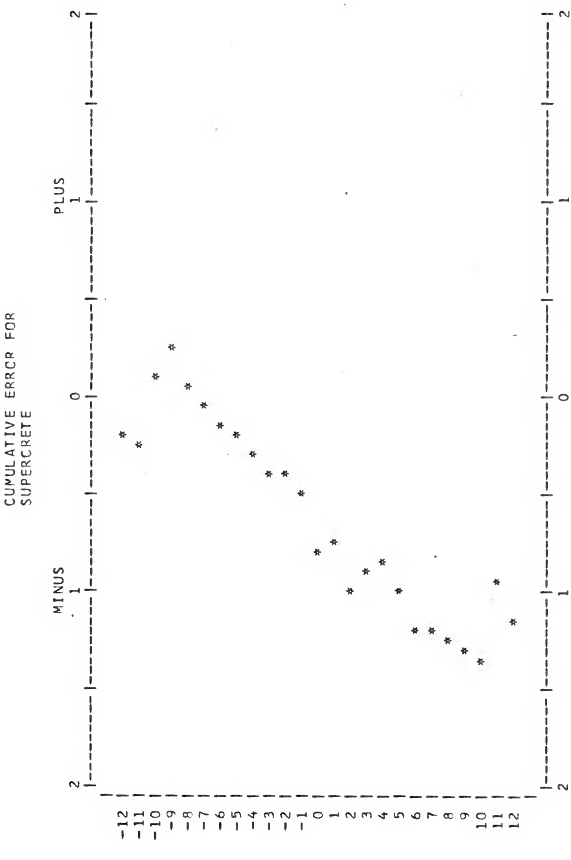
CUMULATIVE ERROR FOR
YONKERS RACEWAY

```
DATA FOR STOCK NO. 29     CANADIAN MERRILL

                    JSPLIT EQUALS   139
                    JFIRST EQUALS     1
                    JLAST  EQUALS   164


      REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
   A           B          CORR      SEY          SEA          SEB

3.12E-01   7.08E-01  0.111   2.34E-01   5.47E-01   5.44E-01


     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION  PREDICTION      ERROR    CUM ERROR

     -12      0.90323      1.05538   -0.15216   -0.15216
     -11      1.03571      1.04547   -0.00976   -0.16191
     -10      0.93103      1.02043   -0.08939   -0.25131
      -9      0.88889      1.05518   -0.16629   -0.41760
      -8      0.87500      1.05623   -0.18123   -0.59883
      -7      1.42857      1.03893    0.38964   -0.20919
      -6      1.16667      1.03750    0.12916   -0.08002
      -5      0.85714      1.05189   -0.19474   -0.27477
      -4      0.83333      1.05040   -0.21707   -0.49183
      -3      0.96000      0.99145   -0.03145   -0.52328
      -2      1.00000      1.01274   -0.01274   -0.53602
      -1      0.91667      0.98823   -0.07156   -0.60758

       0      0.65455      1.06083   -0.40628   -1.01386
       1      1.44444      1.01738    0.42706   -0.58680
       2      0.67308      0.98991   -0.31683   -0.90364
       3      0.98571      1.02405   -0.03834   -0.94197
       4      1.07246      1.07878   -0.00632   -0.94829
       5      1.81081      1.04123    0.76958   -0.17871
       6      0.89552      1.03815   -0.14263   -0.32134
       7      0.83333      1.03319   -0.19986   -0.52119
       8      0.94000      1.02473   -0.08473   -0.60593
       9      0.97872      1.03325   -0.05453   -0.66045
      10      0.97826      1.00832   -0.03006   -0.69051
      11      1.11111      1.02667    0.08444   -0.60607
      12      1.28520      1.04547    0.23973   -0.36634


                   ANALYSIS OF ERROR TERMS

                                      MEAN       STD DEV

             BEFORE SPLIT           -0.05063     0.17077

             AFTER SPLIT             0.01856     0.31266
```

CUMULATIVE ERRCR FOR
CANADIAN MERRILL

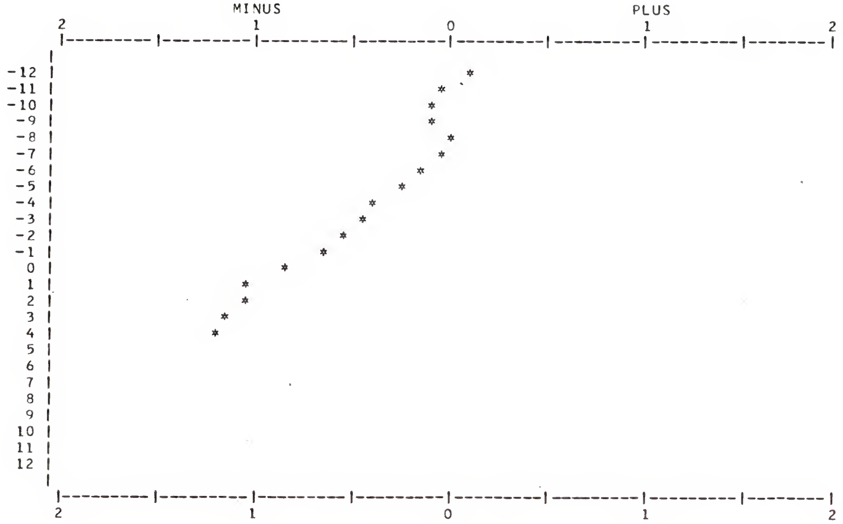


```
DATA FOR STOCK NO. 30     SUPERCRETE

                    JSPLIT EQUALS    117
                    JFIRST EQUALS      5
                    JLAST  EQUALS    164


      REGRESSION STATISTICS BASED ON  135  OBSERVATIONS
   A           B          CORR      SEY         SEA         SEB

-3.41E-02   1.05E 00   0.123    2.95E-01    7.44E-01    7.36E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION  PREDICTION       ERROR    CUM ERROR

     -12      0.83784      1.02087     -0.18303    -0.18303
     -11      1.00439      1.06292     -0.05854    -0.24157
     -10      1.38710      0.96874      0.41836     0.17679
      -9      1.16279      0.99863      0.16416     0.34096
      -8      0.76000      0.98055     -0.22055     0.12041
      -7      0.92105      1.06998     -0.14892    -0.02852
      -6      0.94286      1.03774     -0.09489    -0.12340
      -5      0.96970      1.01865     -0.04895    -0.17235
      -4      0.87500      0.97253     -0.09753    -0.26989
      -3      0.85714      0.95394     -0.09680    -0.36668
      -2      1.04167      1.07014     -0.02847    -0.39515
      -1      0.92000      0.99158     -0.07158    -0.46673

       0      0.76812      1.05817     -0.29005    -0.75678
       1      1.01011      0.97630      0.03381    -0.72297
       2      0.73585      1.01152     -0.27567    -0.99864
       3      1.07692      0.93720      0.13973    -0.85891
       4      1.09524      1.07127      0.02397    -0.83494
       5      0.86957      1.01089     -0.14133    -0.97627
       6      0.75000      0.93024     -0.18024    -1.15651
       7      0.93333      0.95747     -0.02413    -1.18064
       8      0.92857      0.97157     -0.04299    -1.22363
       9      1.03846      1.08852     -0.05006    -1.27369
      10      1.00000      1.06827     -0.06827    -1.34196
      11      1.48148      1.05358      0.42790    -0.91406
      12      0.80000      1.01646     -0.21646    -1.13052


                      ANALYSIS OF ERROR TERMS

                                        MEAN        STD DEV

             BEFORE SPLIT            -0.03889       0.17262

             AFTER SPLIT             -0.05106       0.19137
```

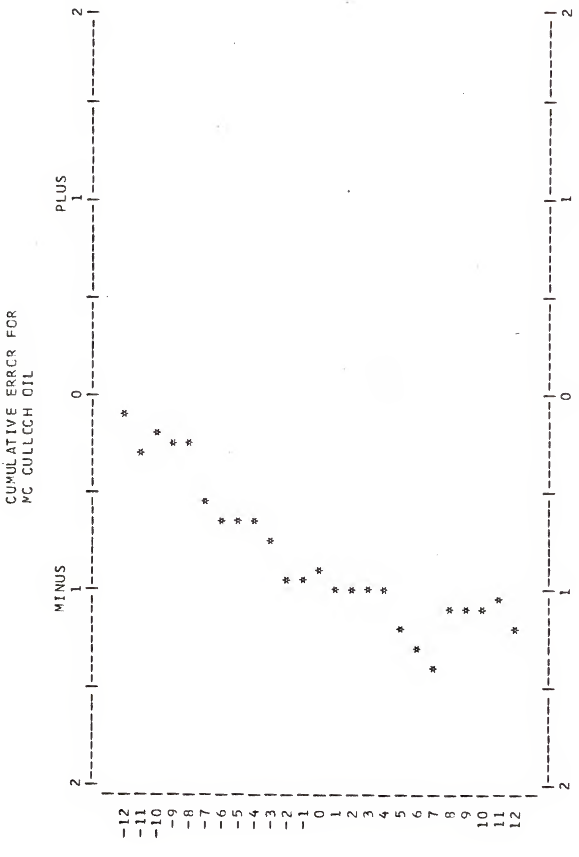

CUMULATIVE ERRCR FOR
SUPERCRETE
MINUS
PLUS
2
1
0
1
2
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
11
12

```
DATA FOR STOCK NO. 31     MADISON SQUARE GARDEN

                         JSPLIT EQUALS    160
                         JFIRST EQUALS     28
                         JLAST  EQUALS    164


    REGRESSION STATISTICS BASED ON   120   OBSERVATIONS
   A            B          CORR      SEY          SEA          SEB

-1.03E-01   1.11E 00   0.285   1.44E-01   3.45E-01   3.42E-01


   DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
  MONTH  OBSERVATION  PREDICTION       ERROR    CUM ERROR

   -12      1.19355       1.02431      0.16924     0.16924
   -11      0.83784       0.98535     -0.14751     0.02173
   -10      0.93548       1.01403     -0.07854    -0.05681
    -9      1.03448       1.04340     -0.00891    -0.06573
    -8      1.13333       0.99609      0.13724     0.07151
    -7      0.97059       1.00362     -0.03303     0.03848
    -6      0.87879       1.05985     -0.18106    -0.14258
    -5      0.96552       1.02421     -0.05869    -0.20127
    -4      0.82143       1.00240     -0.18097    -0.38224
    -3      0.91304       0.96322     -0.05018    -0.43242
    -2      0.90476       1.01037     -0.10561    -0.53803
    -1      0.89474       0.95680     -0.06206    -0.60009

     0      0.76471       0.98846     -0.22375    -0.82384
     1      0.81538       1.00329     -0.18790    -1.01174
     2      1.01887       1.04380     -0.02493    -1.03667
     3      0.88889       0.96754     -0.07865    -1.11532
     4      0.97917       1.03029     -0.05113    -1.16645
     5     99.99998      99.99998     99.99998    99.99998
     6     99.99998      99.99998     99.99998    99.99998
     7     99.99998      99.99998     99.99998    99.99998
     8     99.99998      99.99998     99.99998    99.99998
     9     99.99998      99.99998     99.99998    99.99998
    10     99.99998      99.99998     99.99998    99.99998
    11     99.99998      99.99998     99.99998    99.99998
    12     99.99998      99.99998     99.99998    99.99998


                    ANALYSIS OF ERROR TERMS

                                    MEAN       STD DEV

           BEFORE SPLIT          -0.05001     0.10999

           AFTER SPLIT           -0.11327     0.08752
```

CUMULATIVE ERROR FOR
MADISON SQUARE GARDEN

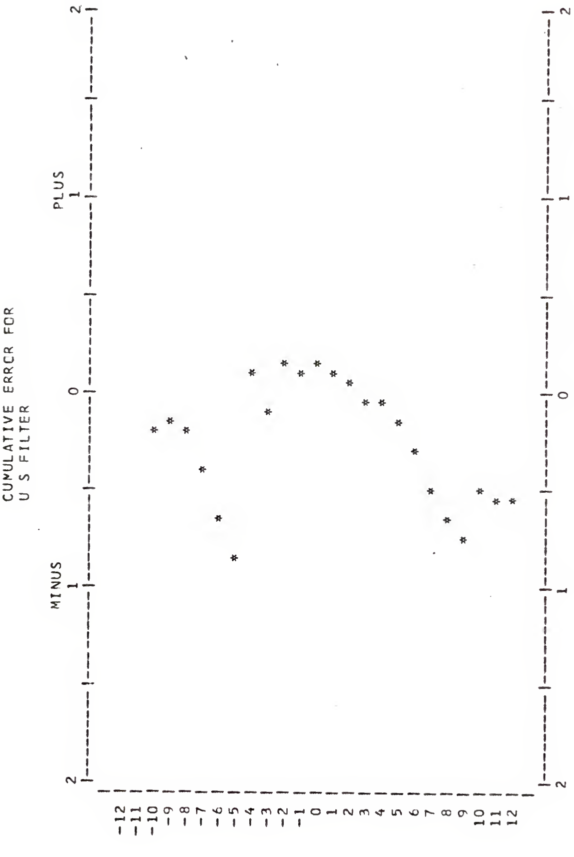


```
DATA FOR STOCK NO. 32      MC CULLOCH OIL

                       JSPLIT EQUALS    41
                       JFIRST EQUALS    11
                       JLAST  EQUALS   164


       REGRESSION STATISTICS BASED ON  129  OBSERVATIONS
   A            B         CORR      SEY          SEA         SEB

-9.85E-01   1.99E 00   0.466   1.36E-01   3.37E-01   3.35E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION      ERROR    CUM ERROR

    -12      0.79167      0.84168    -0.05001    -0.05001
    -11      0.89474      1.13574    -0.24100    -0.29102
    -10      1.17647      1.03846     0.13801    -0.15301
     -9      0.85000      0.90913    -0.05913    -0.21214
     -8      1.00000      1.02841    -0.02841    -0.24055
     -7      0.94118      1.21865    -0.27747    -0.51802
     -6      0.93750      1.03291    -0.09541    -0.61343
     -5      1.06667      1.10152    -0.03485    -0.64829
     -4      0.93750      0.93900    -0.00150    -0.64978
     -3      1.00000      1.09197    -0.09197    -0.74176
     -2      0.93333      1.11688    -0.18355    -0.92530
     -1      1.07143      1.05644     0.01499    -0.91032

      0      0.97333      0.94581     0.02752    -0.88280
      1      0.93151      1.00316    -0.07166    -0.95445
      2      1.07353      1.11194    -0.03841    -0.99287
      3      1.00000      0.99568     0.00432    -0.98854
      4      1.12329      1.09883     0.02446    -0.96408
      5      0.74390      0.96426    -0.22036    -1.18444
      6      0.98361      1.06260    -0.07900    -1.26344
      7      0.95000      1.05959    -0.10959    -1.37302
      8      1.36842      1.04990     0.31852    -1.05451
      9      1.02564      1.04265    -0.01701    -1.07152
     10      1.01250      1.01388    -0.00138    -1.07290
     11      1.07407      1.04103     0.03305    -1.03985
     12      0.90805      1.02490    -0.11685    -1.15670


                  ANALYSIS OF ERROR TERMS

                                  MEAN       STD DEV

         BEFORE SPLIT          -0.07586     0.11464

         AFTER SPLIT           -0.01895     0.12470
```



CUMULATIVE ERRCR FOR
MC CULLCCH OIL

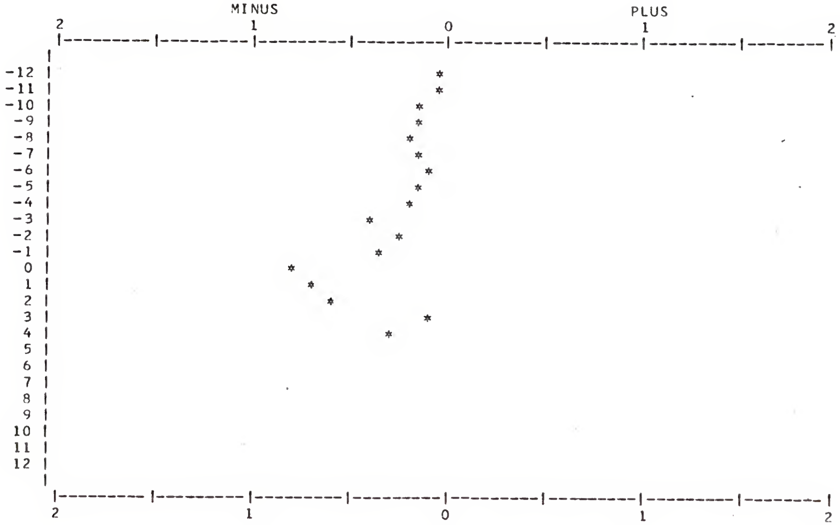
```
DATA FOR STOCK NO. 34     U S FILTER

                    JSPLIT EQUALS    74
                    JFIRST EQUALS    64
                    JLAST  EQUALS   164


     REGRESSION STATISTICS BASED ON    78  OBSERVATIONS
   A             B          CORR      SEY          SEA          SEB

-1.04E 00   2.07E 00   0.321   2.33E-01   7.04E-01   6.99E-01



      DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
     MONTH  OBSERVATION  PREDICTION      ERROR    CUM ERROR

      -12     99.99998     99.99998     99.99998    99.99998
      -11     99.99998     99.99998     99.99998    99.99998
      -10      0.80000      0.99568     -0.19568    -0.19568
       -9      1.00000      0.93457      0.06543    -0.13025
       -8      1.00000      1.05916     -0.05916    -0.18941
       -7      0.87500      1.07496     -0.19996    -0.38937
       -6      0.85714      1.11262     -0.25548    -0.64485
       -5      0.91667      1.10293     -0.18627    -0.83112
       -4      2.00000      0.99781      1.00219     0.17108
       -3      0.81818      1.05483     -0.23665    -0.06557
       -2      1.33333      1.03106      0.30227     0.23669
       -1      0.91667      0.98307     -0.06640     0.17029

        0      1.04545      0.98019      0.06526     0.23555
        1      1.00000      1.04130     -0.04130     0.19425
        2      0.84348      0.93211     -0.08863     0.10562
        3      0.88660      0.97783     -0.09123     0.01439
        4      0.95349      0.99383     -0.04034    -0.02595
        5      0.78049      0.88750     -0.10701    -0.13296
        6      0.84375      0.98555     -0.14180    -0.27476
        7      0.94444      1.12678     -0.18234    -0.45710
        8      0.86275      1.02031     -0.15756    -0.61466
        9      0.88636      1.00963     -0.12327    -0.73793
       10      1.46154      1.19835      0.26319    -0.47474
       11      0.98246      1.03720     -0.05474    -0.52948
       12      1.12500      1.11961      0.00539    -0.52409



                   ANALYSIS OF ERROR TERMS

                                   MEAN       STD DEV

             BEFORE SPLIT        0.01703     0.38576

             AFTER SPLIT        -0.05341     0.11683
```



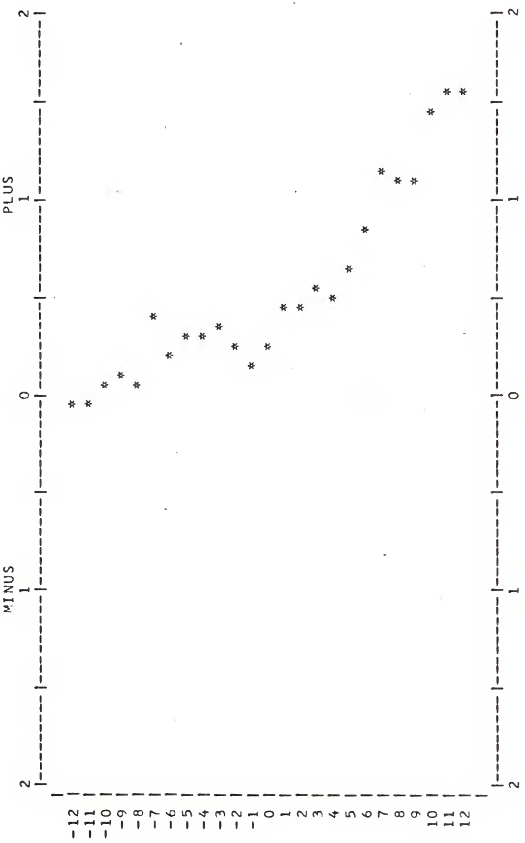
CUMULATIVE ERRCR FOR
U S FILTER

```
DATA FOR STOCK NO. 35     ELGIN NATIONAL

                    JSPLIT EQUALS   160
                    JFIRST EQUALS     1
                    JLAST  EQUALS   164


   REGRESSION STATISTICS BASED ON  147  OBSERVATIONS
  A            B         CORR      SEY          SEA          SEB

6.65E-01  3.35E-01  0.072   2.58E-01   3.88E-01   3.83E-01


   DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
  MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

  -12       1.01961       1.00543      0.01417    0.01417
  -11       0.94231       0.99366     -0.05135   -0.03718
  -10       0.93878       1.00233     -0.06355   -0.10072
   -9       0.97826       1.01120     -0.03294   -0.13367
   -8       0.93333       0.99690     -0.06357   -0.19724
   -7       1.09524       0.99918      0.09606   -0.10118
   -6       1.04348       1.01618      0.02730   -0.07388
   -5       0.97917       1.00540     -0.02624   -0.10011
   -4       0.93617       0.99881     -0.06264   -0.16276
   -3       0.77273       0.98697     -0.21424   -0.37700
   -2       1.14706       1.00122      0.14584   -0.23116
   -1       0.89744       0.98503     -0.08759   -0.31875

    0       0.56190       0.99460     -0.43269   -0.75144
    1       1.05085       0.99908      0.05177   -0.69967
    2       1.11290       1.01132      0.10158   -0.59810
    3       1.52174       0.98827      0.53347   -0.06463
    4       0.79048       1.00724     -0.21677   -0.28140
    5      99.99998      99.99998     99.99998   99.99998
    6      99.99998      99.99998     99.99998   99.99998
    7      99.99998      99.99998     99.99998   99.99998
    8      99.99998      99.99998     99.99998   99.99998
    9      99.99998      99.99998     99.99998   99.99998
   10      99.99998      99.99998     99.99998   99.99998
   11      99.99998      99.99998     99.99998   99.99998
   12      99.99998      99.99998     99.99998   99.99998


                  ANALYSIS OF ERROR TERMS

                                   MEAN       STD DEV

            BEFORE SPLIT        -0.02656      0.09193

            AFTER SPLIT          0.00747      0.36453
```

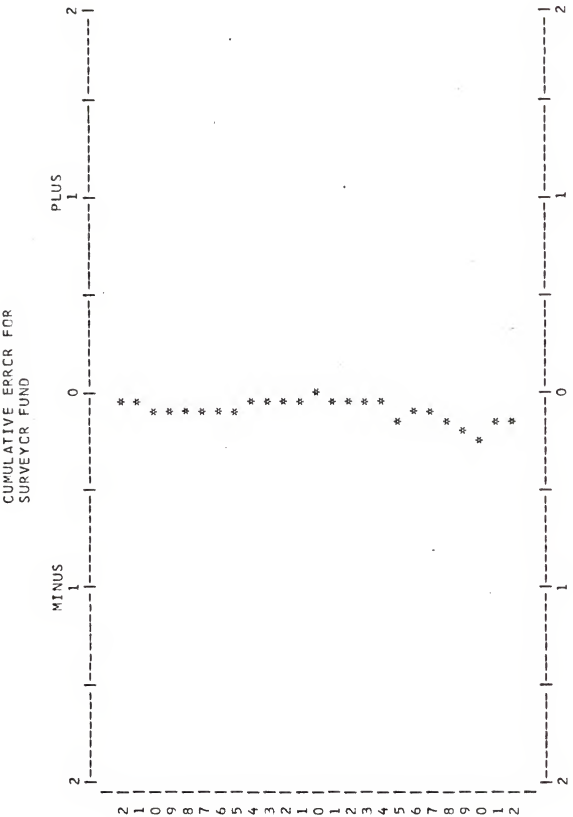
CUMULATIVE ERRCR FOR
ELGIN NATICNAL



```
DATA FOR STOCK NO. 36      MONOGRAM INDUSTRIES

                      JSPLIT EQUALS    64
                      JFIRST EQUALS     1
                      JLAST  EQUALS   164


     REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
  A            B         CORR      SEY          SEA          SEB

-8.32E-01  1.82E 00  0.431   1.45E-01   3.28E-01   3.25E-01



    DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

    -12      1.00000       1.02047    -0.02047   -0.02047
    -11      1.00000       1.00573    -0.00573   -0.02620
    -10      1.20000       1.02927     0.17073    0.14453
     -9      1.00000       0.96806     0.03194    0.17647
     -8      1.00000       1.04862    -0.04862    0.12785
     -7      1.33333       0.99253     0.34080    0.46865
     -6      0.81250       0.99040    -0.17790    0.29075
     -5      1.07692       0.99968     0.07724    0.36799
     -4      1.07143       1.05872     0.01271    0.38070
     -3      1.00000       0.97545     0.02455    0.40525
     -2      0.86667       0.96878    -0.10211    0.30314
     -1      1.00000       1.06872    -0.06872    0.23442

      0      1.03846       0.96047     0.07799    0.31241
      1      1.12963       0.90668     0.22295    0.53536
      2      1.00000       1.01632    -0.01632    0.51904
      3      1.13115       1.03023     0.10092    0.61995
      4      1.02899       1.06337    -0.03439    0.58557
      5      1.21127       1.05485     0.15642    0.74199
      6      1.12791       0.96233     0.16557    0.90756
      7      1.30928       1.01252     0.29676    1.20432
      8      0.97638       0.99160    -0.01522    1.18909
      9      0.95161       0.94936     0.00225    1.19134
     10      1.26271       0.94684     0.31588    1.50722
     11      1.09396       1.00061     0.09335    1.60056
     12      0.92638       0.90452     0.02186    1.62242


                    ANALYSIS OF ERROR TERMS

                                   MEAN       STD DEV

         BEFORE SPLIT            0.01953     0.13419

         AFTER SPLIT             0.10677     0.11845
```

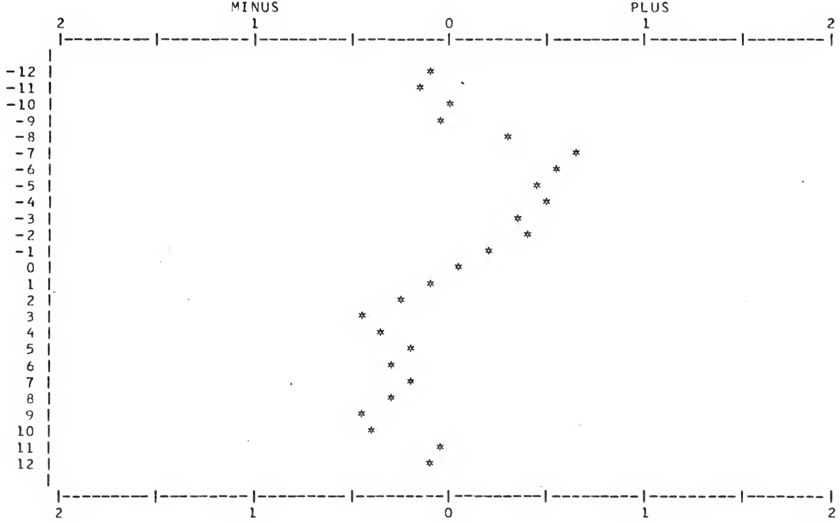

CUMULATIVE ERROR FOR
MONOGRAM INDUSTRIES

```
DATA FOR STOCK NO. 37      SURVEYOR FUND

                      JSPLIT EQUALS   148
                      JFIRST EQUALS     1
                      JLAST  EQUALS   164


     REGRESSION STATISTICS BASED ON  139  OBSERVATIONS
   A            B          CORR      SEY          SEA          SEB

4.29E-01   5.75E-01  0.452   4.21E-02   9.79E-02   9.70E-02


    DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION      ERROR    CUM ERROR

    -12       0.97826       0.98084    -0.00258    -0.00258
    -11       0.97778       0.99813    -0.02035    -0.02293
    -10       0.91977       0.97823    -0.05845    -0.08138
     -9       1.05000       1.03717     0.01283    -0.06855
     -8       1.00000       1.00190    -0.00190    -0.07045
     -7       0.98738       0.97959     0.00779    -0.06266
     -6       1.00000       1.00731    -0.00731    -0.06997
     -5       1.04878       1.05174    -0.00296    -0.07294
     -4       1.12581       1.02126     0.10456     0.03162
     -3       1.00000       1.01876    -0.01876     0.01286
     -2       0.97917       1.01473    -0.03556    -0.02270
     -1       1.05128       1.00786     0.04341     0.02071

      0       1.05102       1.01478     0.03624     0.05695
      1       0.92718       0.99454    -0.06735    -0.01040
      2       0.97717       1.00944    -0.03226    -0.04267
      3       1.02162       1.02470    -0.00308    -0.04574
      4       1.02116       1.00012     0.02104    -0.02470
      5       0.92560       1.00403    -0.07843    -0.10313
      6       1.05085       1.03324     0.01760    -0.08553
      7       1.02151       1.01473     0.00678    -0.07875
      8       0.95730       1.00340    -0.04609    -0.12485
      9       0.91111       0.98304    -0.07193    -0.19677
     10       0.98171       1.00754    -0.02583    -0.22261
     11       1.09247       0.97970     0.11277    -0.10984
     12       0.98276       0.99615    -0.01339    -0.12323


                    ANALYSIS OF ERROR TERMS

                                   MEAN      STD DEV

           BEFORE SPLIT          0.00173     0.04104

           AFTER SPLIT          -0.01107     0.05253
```


CUMULATIVE ERRCR FOR
SURVEYCR FUND
MINUS
PLUS
2
1
0
1
2
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
11
12

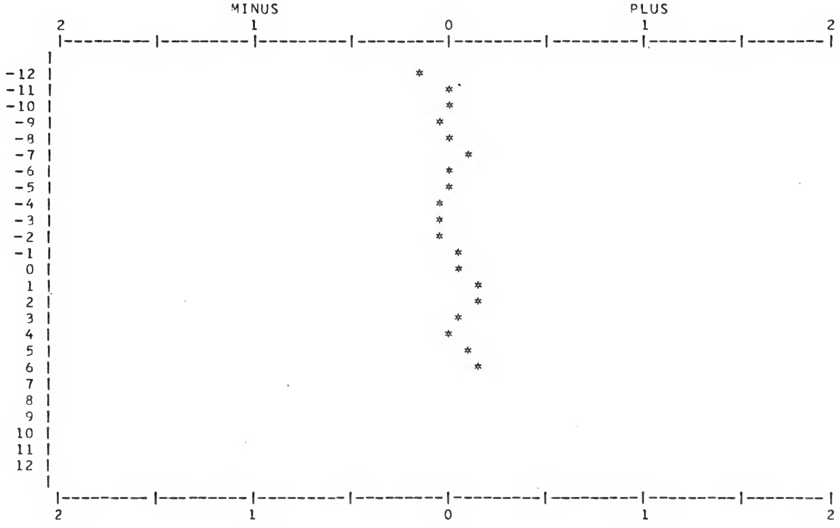
```
DATA FOR STOCK NO. 38     FIRST S & L SHARES

                          JSPLIT EQUALS   110
                          JFIRST EQUALS    24
                          JLAST  EQUALS   164


     REGRESSION STATISTICS BASED ON  116  OBSERVATIONS
  A          B         CORR      SEY          SEA         SEB

1.38E-02   9.83E-01  0.261   1.35E-01   3.44E-01   3.41E-01



    DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

    -12      0.95238      1.01356    -0.06118   -0.06118
    -11      1.02500      1.09399    -0.06899   -0.13018
    -10      1.21951      0.99815     0.22136    0.09118
     -9      0.96000      1.00622    -0.04622    0.04496
     -8      1.33333      0.97983     0.35350    0.39846
     -7      1.31250      1.01095     0.30155    0.70001
     -6      0.95238      1.03250    -0.08012    0.61989
     -5      0.91250      1.00194    -0.08944    0.53046
     -4      1.09589      1.04133     0.05457    0.58502
     -3      0.81250      0.95311    -0.14061    0.44442
     -2      1.03151      0.98110     0.05040    0.49482
     -1      0.76119      0.96417    -0.20298    0.29184

      0      0.89412      1.04793    -0.15381    0.13803
      1      0.80368      1.01774    -0.21406   -0.07603
      2      0.84699      0.99985    -0.15286   -0.22889
      3      0.77420      0.95666    -0.18247   -0.41136
      4      1.00200      0.93925     0.06275   -0.34861
      5      1.21666      1.04808     0.16858   -0.18002
      6      0.87671      0.97450    -0.09779   -0.27782
      7      1.15032      1.03687     0.11345   -0.16437
      8      0.85034      0.96019    -0.10986   -0.27423
      9      0.85600      0.99318    -0.13718   -0.41140
     10      0.96778      0.92356     0.04422   -0.36718
     11      1.37864      1.04914     0.32950   -0.03769
     12      0.97887      0.99259    -0.01372   -0.05141


                    ANALYSIS OF ERROR TERMS

                                   MEAN       STD DEV

            BEFORE SPLIT         0.02432      0.17821

            AFTER SPLIT         -0.02640      0.16162
```

CUMULATIVE ERROR FOR
FIRST S & L SHARES



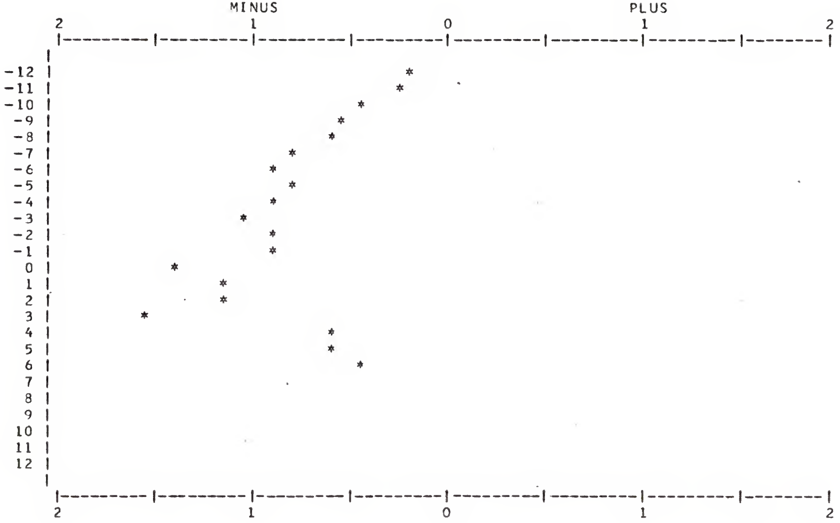
```
    DATA FOR STOCK NO. 39      PLESSY

                         JSPLIT EQUALS    158
                         JFIRST EQUALS    127
                         JLAST  EQUALS    164


          REGRESSION STATISTICS BASED ON    19  OBSERVATIONS
      A            B          CORR      SEY          SEA          SEB

 -3.04E-01   1.29E 00   0.383   1.15E-01   7.68E-01   7.53E-01



          DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
        MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

         -12      0.86364      1.00736    -0.14373    -0.14373
         -11      1.21053      0.99199     0.21853     0.07480
         -10      1.01093      1.00748     0.00345     0.07826
          -9      0.91304      0.96215    -0.04911     0.02915
          -8      1.04762      0.99551     0.05211     0.08126
          -7      1.10233      1.02968     0.07265     0.15391
          -6      0.91667      0.97465    -0.05798     0.09593
          -5      0.95455      0.98341    -0.02886     0.06707
          -4      1.01197      1.04882    -0.03685     0.03021
          -3      0.95238      1.00736    -0.05498    -0.02477
          -2      1.00000      0.98199     0.01801    -0.00675
          -1      1.05823      0.93640     0.12183     0.11507

           0      1.00000      0.99126     0.00874     0.12381
           1      1.04762      0.92893     0.11869     0.24250
           2      0.93021      0.96576    -0.03556     0.20694
           3      0.91626      0.98302    -0.06676     0.14018
           4      0.98925      1.03015    -0.04090     0.09927
           5      1.01438      0.94142     0.07295     0.17223
           6      1.06486      1.01444     0.05042     0.22265
           7     99.99998     99.99998    99.99998    99.99998
           8     99.99998     99.99998    99.99998    99.99998
           9     99.99998     99.99998    99.99998    99.99998
          10     99.99998     99.99998    99.99998    99.99998
          11     99.99998     99.99998    99.99998    99.99998
          12     99.99998     99.99998    99.99998    99.99998


                         ANALYSIS OF ERROR TERMS

                                          MEAN      STD DEV

                BEFORE SPLIT            0.00959     0.09604

                AFTER SPLIT             0.01537     0.06803
```

CUMULATIVE ERROR FOR
PLESSY



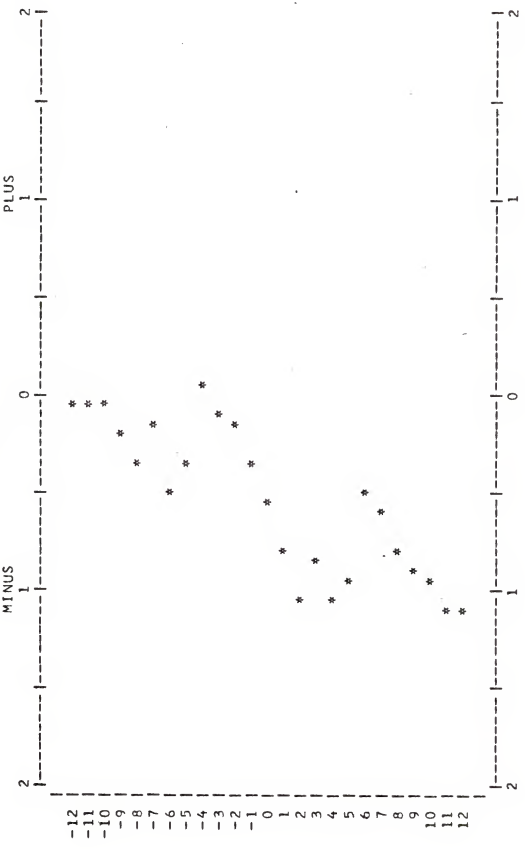
```
DATA FOR STOCK NO. 40     PRUDENTIAL FUNDS

                         JSPLIT EQUALS   158
                         JFIRST EQUALS   125
                         JLAST  EQUALS   164


   REGRESSION STATISTICS BASED ON    21  OBSERVATIONS
 A           B         CORR      SEY          SEA          SEB

2.82E-01   7.00E-01  0.139   1.98E-01   1.17E 00    1.15E 00



   DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
  MONTH  OBSERVATION  PREDICTION      ERROR    CUM ERROR

   -12      0.81081      0.99451     -0.18370    -0.18370
   -11      0.93334      0.98615     -0.05282    -0.23652
   -10      0.78750      0.99457     -0.20707    -0.44359
    -9      0.87272      0.96994     -0.09721    -0.54080
    -8      0.93750      0.98807     -0.05057    -0.59136
    -7      0.83611      1.00663     -0.17053    -0.76189
    -6      0.86667      0.97673     -0.11006    -0.87195
    -5      1.07691      0.98149      0.09542    -0.77653
    -4      0.93215      1.01703     -0.08489    -0.86141
    -3      0.84614      0.99450     -0.14836    -1.00977
    -2      1.09092      0.98072      0.11020    -0.89957
    -1      1.00000      0.95595      0.04405    -0.85552

     0      0.45000      0.98576     -0.53576    -1.39128
     1      1.22222      0.95189      0.27033    -1.12094
     2      0.95455      0.97190     -0.01736    -1.13830
     3      0.57143      0.98128     -0.40985    -1.54814
     4      2.00000      1.00689      0.99311    -0.55503
     5      0.95833      0.95868     -0.00034    -0.55537
     6      1.13043      0.99835      0.13208    -0.42329
     7     99.99998     99.99998     99.99998    99.99998
     8     99.99998     99.99998     99.99998    99.99998
     9     99.99998     99.99998     99.99998    99.99998
    10     99.99998     99.99998     99.99998    99.99998
    11     99.99998     99.99998     99.99998    99.99998
    12     99.99998     99.99998     99.99998    99.99998


                     ANALYSIS OF ERROR TERMS

                                  MEAN       STD DEV

           BEFORE  SPLIT        -0.07129     0.10618

           AFTER  SPLIT          0.06175     0.50090
```

CUMULATIVE ERROR FOR
PRUDENTIAL FUNDS

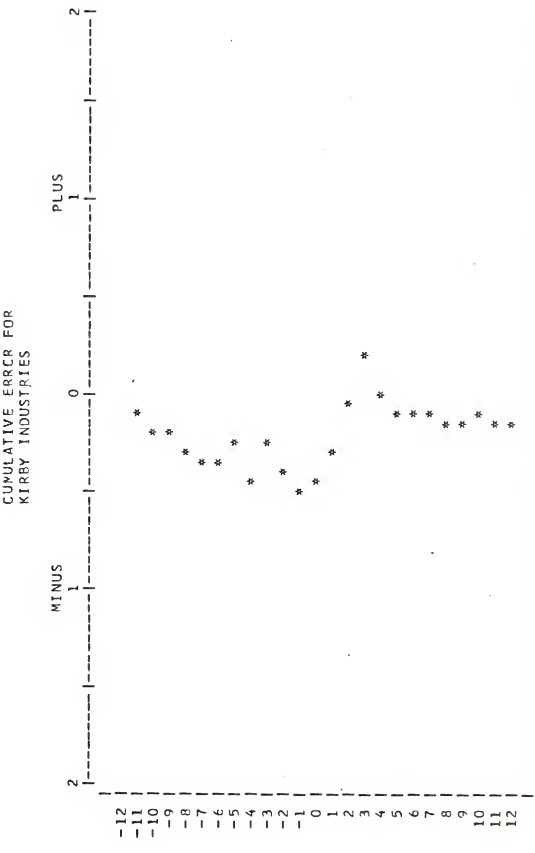


```
DATA FOR STOCK NO. 41     MARINDUQUE MINING

                  JSPLIT EQUALS   138
                  JFIRST EQUALS   100
                  JLAST  EQUALS   164


   REGRESSION STATISTICS BASED ON    40  OBSERVATIONS
 A            B          CORR       SEY          SEA          SEB

3.35E-01   6.75E-01  0.120   2.06E-01   9.02E-01   9.05E-01


  DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
 MONTH  OBSERVATION  PREDICTION      ERROR   CUM ERROR

  -12      1.05763       1.05701     0.00062     0.00062
  -11      1.00000       1.04399    -0.04399    -0.04337
  -10      1.10000       1.03454     0.06546     0.02210
   -9      0.83452       1.01066    -0.17615    -0.15405
   -8      0.88899       1.04379    -0.15490    -0.30896
   -7      1.21875       1.04480     0.17395    -0.13501
   -6      0.70513       1.02830    -0.32317    -0.45818
   -5      1.18182       1.02694     0.15488    -0.30330
   -4      1.46154       1.04065     0.42088     0.11758
   -3      0.84211       1.03924    -0.19713    -0.07955
   -2      0.92187       0.98304    -0.06116    -0.14071
   -1      0.79661       1.00334    -0.20673    -0.34743

    0      0.82447       0.97997    -0.15550    -0.50293
    1      0.78065       1.04918    -0.26853    -0.77146
    2      0.73554       1.00776    -0.27222    -1.04369
    3      1.22472       0.98157     0.24315    -0.80054
    4      0.78899       1.01412    -0.22513    -1.02567
    5      1.16279       1.06629     0.09650    -0.92917
    6      1.48000       1.03049     0.44951    -0.47966
    7      0.93243       1.02756    -0.09513    -0.57479
    8      0.80435       1.02283    -0.21848    -0.79327
    9      0.94595       1.01477    -0.06882    -0.86209
   10      0.98095       1.02289    -0.04194    -0.90403
   11      0.80583       0.99912    -0.19329    -1.09732
   12      1.06024       1.01661     0.04363    -1.05370


                 ANALYSIS OF ERROR TERMS

                               MEAN       STD DEV

         BEFORE SPLIT        -0.02895     0.20722

         AFTER SPLIT         -0.05433     0.21520
```

CUMULATIVE ERRCR FOR
MARINDUQUE MINING



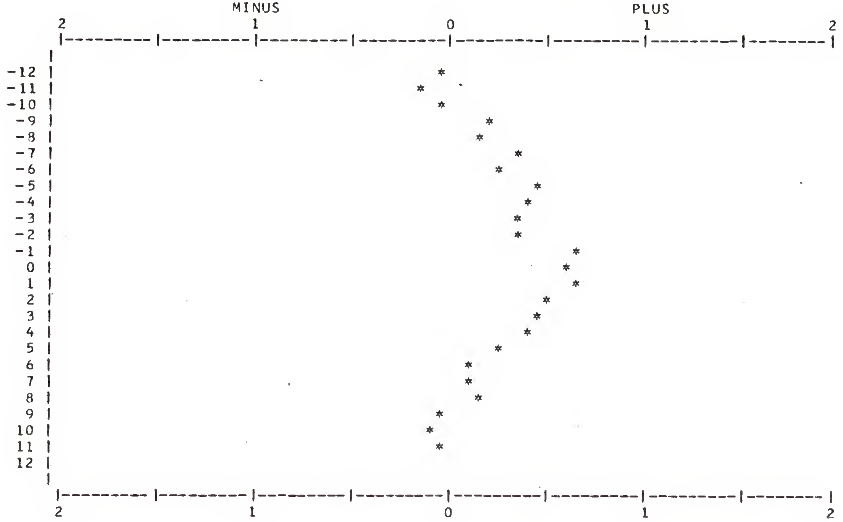
```
DATA FOR STOCK NO. 42      KIRBY INDUSTRIES

                    JSPLIT EQUALS     12
                    JFIRST EQUALS      1
                    JLAST  EQUALS    164


      REGRESSION STATISTICS BASED ON  140  OBSERVATIONS
    A           B           CORR      SEY          SEA         SEB

3.16E-01   6.95E-01  0.205   1.40E-01   2.85E-01   2.82E-01


     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION  PREDICTION       ERROR    CUM ERROR

     -12     99.99998     99.99998     99.99998    99.99998
     -11      0.95238      1.01031     -0.05793    -0.05793
     -10      0.90000      0.99959     -0.09959    -0.15751
      -9      1.00000      0.99471      0.00529    -0.15222
      -8      0.88889      1.03241     -0.14352    -0.29574
      -7      1.00000      1.02905     -0.02905    -0.32479
      -6      1.00000      0.99169      0.00831    -0.31648
      -5      1.12500      1.02584      0.09916    -0.21732
      -4      0.77778      0.96895     -0.19117    -0.40849
      -3      1.21428      1.00855      0.20573    -0.20276
      -2      0.88235      1.03455     -0.15220    -0.35496
      -1      0.93333      1.03423     -0.10090    -0.45586

       0      1.10000      1.05417      0.04583    -0.41003
       1      1.16883      1.03014      0.13869    -0.27134
       2      1.31111      1.02309      0.28802     0.01668
       3      1.25424      1.01101      0.24323     0.25991
       4      0.83784      1.02788     -0.19004     0.06987
       5      0.87097      0.99939     -0.12842    -0.05855
       6      1.03704      1.03548      0.00156    -0.05700
       7      1.02678      1.02455      0.00224    -0.05476
       8      0.92174      1.00386     -0.08212    -0.13688
       9      1.01887      1.03088     -0.01201    -0.14889
      10      1.09259      1.03482      0.05777    -0.09112
      11      0.97458      1.02177     -0.04719    -0.13831
      12      1.00870      0.98790      0.02079    -0.11752


                 ANALYSIS OF ERROR TERMS

                                    MEAN      STD DEV

            BEFORE SPLIT          -0.04144    0.11746

            AFTER SPLIT            0.02603    0.13545
```



CUMULATIVE ERRCR FOR
KIRBY INDUSTRIES

```
DATA FOR STOCK NO. 43     WHEELABRATOR-FRYE INTERNATIONAL

                         JSPLIT EQUALS   150
                         JFIRST EQUALS    76
                         JLAST  EQUALS   161


     REGRESSION STATISTICS BASED ON    62  OBSERVATIONS
   A             B          CORR       SEY          SEA          SEB

-6.24E-01   1.62E 00   0.425    1.44E-01    4.47E-01    4.45E-01



     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH   OBSERVATION   PREDICTION      ERROR     CUM ERROR

    -12       0.94737       0.91880      0.02856     0.02856
    -11       0.91667       1.08435     -0.16768    -0.13912
    -10       1.15152       0.98529      0.16623     0.02711
     -9       1.18421       0.92264      0.26157     0.28867
     -8       0.93333       1.00049     -0.06716     0.22152
     -7       1.30952       1.12529      0.18424     0.40576
     -6       0.98192       1.03966     -0.05774     0.34801
     -5       1.20370       1.03264      0.17106     0.51908
     -4       0.98462       1.02133     -0.03671     0.48237
     -3       0.92187       1.00205     -0.08017     0.40219
     -2       1.05085       1.02147      0.02938     0.43157
     -1       1.25032       0.96462      0.28570     0.71727

      0       0.94796       1.00646     -0.05851     0.65877
      1       1.09589       1.04932      0.04657     0.70534
      2       0.84583       0.98030     -0.13446     0.57087
      3       0.93103       0.99128     -0.06024     0.51063
      4       1.01587       1.07333     -0.05745     0.45318
      5       0.90937       1.02132     -0.11194     0.34123
      6       0.83237       0.98950     -0.15713     0.18410
      7       0.90972       0.93233     -0.02260     0.16150
      8       1.05954       1.00113      0.05841     0.21991
      9       0.71739       0.92296     -0.20557     0.01434
     10       0.87879       0.96915     -0.09036    -0.07603
     11       1.02069       0.99079      0.02990    -0.04613
     12      99.99998      99.99998     99.99998    99.99998


                         ANALYSIS OF ERROR TERMS

                                        MEAN        STD DEV

              BEFORE  SPLIT            0.05977      0.14876

              AFTER SPLIT             -0.06362      0.08230
```

CUMULATIVE ERROR FOR
WHEELABRATCR-FRYE INTERNATIONAL



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DATA FOR STOCK NO. 44     ATLAS CONSOLIDATED MINING

                    JSPLIT EQUALS     51
                    JFIRST EQUALS      1
                    JLAST  EQUALS    119


     REGRESSION STATISTICS BASED ON    94  OBSERVATIONS
   A            B         CORR       SEY           SEA          SEB

3.96E 00  -2.82E 00 -0.111   9.62E-01   2.65E 00   2.63E 00


    DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
   MONTH  OBSERVATION  PREDICTION       ERROR   CUM ERROR

    -12       1.03175       0.98080     0.05094     0.05094
    -11       1.27692       1.06652     0.21040     0.26134
    -10       1.00000       1.22344    -0.22344     0.03790
     -9       1.13253       1.14210    -0.00957     0.02833
     -8       1.31915       0.98780     0.33135     0.35967
     -7       0.87903       1.15272    -0.27369     0.08599
     -6       0.98165       1.00641    -0.02476     0.06123
     -5       0.92523       1.19728    -0.27204    -0.21081
     -4       1.22222       1.05779     0.16443    -0.04638
     -3       0.97521       1.06206    -0.08685    -0.13323
     -2       0.93220       1.07580    -0.14360    -0.27683
     -1       1.10909       1.08609     0.02300    -0.25383

      0       0.91803       1.12690    -0.20887    -0.46269
      1       0.87500       1.08839    -0.21339    -0.67609
      2       0.96939       1.11127    -0.14189    -0.81797
      3       0.89474       1.07475    -0.18001    -0.99798
      4       1.01176       1.16973    -0.15796    -1.15595
      5       0.95349       1.04472    -0.09123    -1.24718
      6       0.92683       1.13175    -0.20492    -1.45210
      7       0.96053       1.13506    -0.17453    -1.62663
      8       0.93151       1.12066    -0.18916    -1.81579
      9       1.17647       1.02905     0.14742    -1.66837
     10       1.00000       1.15825    -0.15825    -1.82662
     11       0.97998       1.16861    -0.18863    -2.01525
     12       1.00000       1.01353    -0.01353    -2.02878

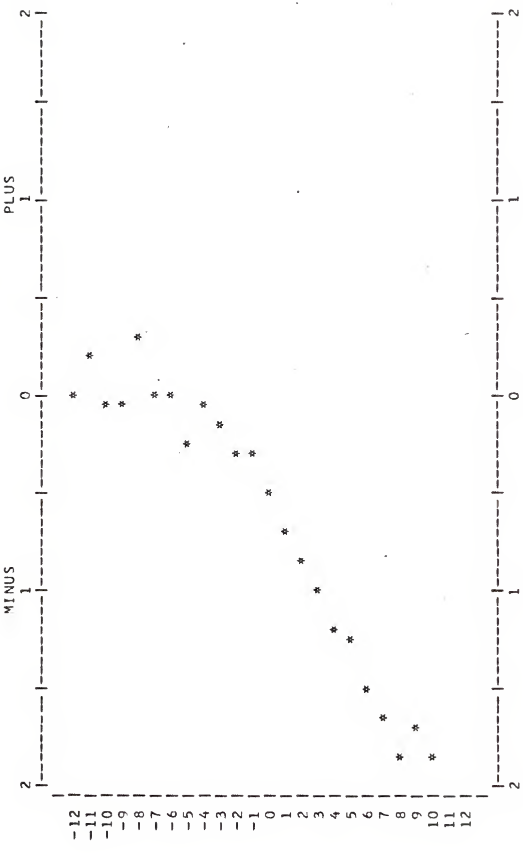

                    ANALYSIS OF ERROR TERMS

                                  MEAN       STD DEV

           BEFORE  SPLIT        -0.02115     0.19225

           AFTER  SPLIT         -0.13654     0.10141
```

CUMULATIVE ERROR FOR
ATLAS CONSOLIDATED MINING



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DATA FOR STOCK NO. 45     KINGSFORD CO.

                        JSPLIT EQUALS    61
                        JFIRST EQUALS     1
                        JLAST  EQUALS   119


     REGRESSION STATISTICS BASED ON    94  OBSERVATIONS
   A           B         CORR      SEY        SEA          SEB

-8.38E-01   1.85E 00  0.378   1.75E-01   4.76E-01   4.73E-01


     DETAILS FOR PERIOD SURROUNDING REVERSE STOCK SPLIT
    MONTH  OBSERVATION  PREDICTION      ERROR    CUM ERROR

     -12       1.00000       1.05987    -0.05987    -0.05987
     -11       1.10464       1.05310     0.05154    -0.00833
     -10       0.92855       1.02627    -0.09772    -0.10605
      -9       0.92309       1.05159    -0.12850    -0.23455
      -8       0.94668       1.03654    -0.08986    -0.32441
      -7       1.00000       1.06056    -0.06056    -0.38497
      -6       1.09089       0.99811     0.09278    -0.29218
      -5       1.03000       1.08030    -0.05030    -0.34249
      -4       1.08332       1.02308     0.06024    -0.28225
      -3       0.92309       1.02090    -0.09782    -0.38006
      -2       1.11332       1.03037     0.08295    -0.29711
      -1       1.15386       1.09060     0.06326    -0.23386

       0       0.93334       1.00565    -0.07231    -0.30617
       1       1.35712       0.99884     0.35827     0.05211
       2       1.01088       1.10081    -0.08994    -0.03783
       3       0.98924       0.99036    -0.00113    -0.03895
       4       0.88044       0.93549    -0.05505    -0.09400
       5       1.12821       1.04735     0.08086    -0.01314
       6       0.92045       1.06154    -0.14109    -0.15423
       7       1.01235       1.09536    -0.08300    -0.23723
       8       1.10125       1.08665     0.01460    -0.22264
       9       0.90806       0.99227    -0.08421    -0.30685
      10       1.26582       1.04347     0.22235    -0.08450
      11       1.18556       1.02213     0.16343     0.07893
      12       0.99130       0.97904     0.01226     0.09119


                        ANALYSIS OF ERROR TERMS

                                         MEAN       STD DEV

                BEFORE SPLIT           -0.01949     0.08241

                AFTER SPLIT             0.02500     0.14535
```

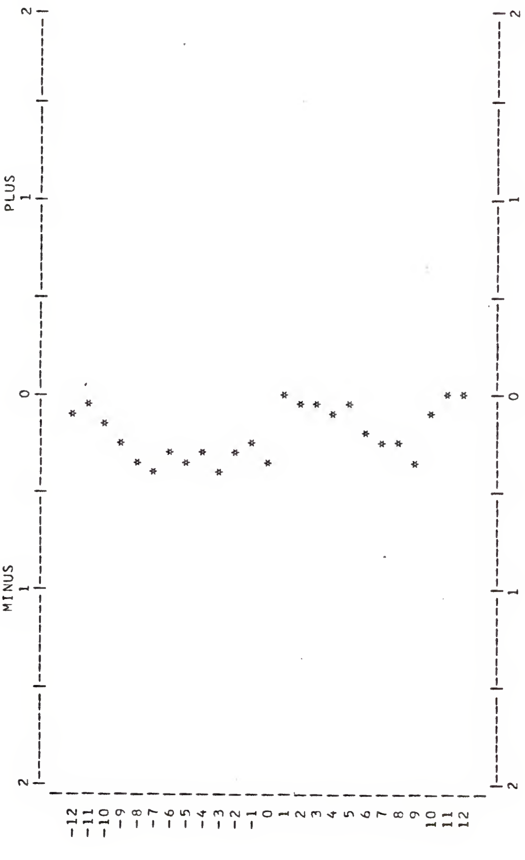

CUMULATIVE ERROR FOR
KINGSFORD CO.

# BIOGRAPHICAL SKETCH

William Bartmess Gillespie was born at Cairo, Illinois on August 23, 1937 - the eldest son of Jane B. and William L. Gillespie. In 1942 he moved with his family to Sikeston, Missouri where he attended the public schools until 1953. In 1953 he entered Columbia Military Academy in Columbia, Tennessee, and was graduated in 1955.

After attending Vanderbilt University in 1955 and 1956 he entered The Citadel, Charleston, South Carolina and was graduated in 1960. In the fall of 1960 he entered Washington University, St. Louis, Missouri and was awarded the M.B.A. degree in 1962. In the fall of 1962 he entered the Ph.D. program in the College of Business Administration, University of Florida.

In 1967 he entered the United States Air Force and was assigned to the Air Force Systems Command at Wright-Patterson Air Force Base, Ohio. Upon leaving active duty in 1970 he accepted a position as assitant professor of Finance and Accounting at the University of West Florida, Pensacola, Florida which position he currently holds.

Mr. Gillespie is unmarried and resides at Pensacola, Florida. He has one brother Robert P. Gillespie (Ph.D.) of Monterey, California.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

John B. McFerrin
John B. McFerrin, Chairman
Professor of Finance

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Robert C. Radcliffe
Robert C. Radcliffe, Co-Chairman
Assistant Professor of Finance

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Ralph H. Blodgett
Ralph H. Blodgett
Professor of Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

C. Arnold Matthews
C. Arnold Matthews
Professor of Finance

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

John H. James

John H. James
Associate Professor of Management

This dissertation was submitted to the Graduate Faculty of the Department of Finance in the College of Business Administration and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

June, 1974

Harry H. Sisler
Dean, Graduate School